KNOWLEDGE

NO. 192 VOLUME 16 The colour magazine which grows into an encyclopaedia EVERY MONDAY 2/-

Seymour 3/

ZO

Advisory Editorial Board *Lady Violet Bonham Carter, D.B.E., Prof. C. N. L. Brooke, M.A., Mr. Norman Fisher, M.A., Mr. Walter Hamilton, M.A., Mr. John Sparrow, M.A., Dr. Dudley Stamp, C.B.E., D.Sc., Sir George Thomson, F.R.S., D.Sc.*

Editor-in-chief: *John Chancellor, M.A.*

Editor: *William Armstrong, M.A.; Assistant Editor: Christopher Falkus, B.A.*

Editorial address: 37 Hertford St., London W.1.

Z ZOOLOGY (part two)

THE whole of our second article on zoology deals with classification. The system by which animals are classified is based on one invented by Linnaeus in the 18th century. Under this system each kind of animal is given a name to indicate its species. Similar species are grouped in a genus; genera are grouped in Families, Families in Orders, Orders in Classes, and Classes in Phyla. The Phyla are divided into two Subkingdoms which together make up the Animal Kingdom. The scientific name of an animal consists of the two smallest categories, genus and species, quoted together.

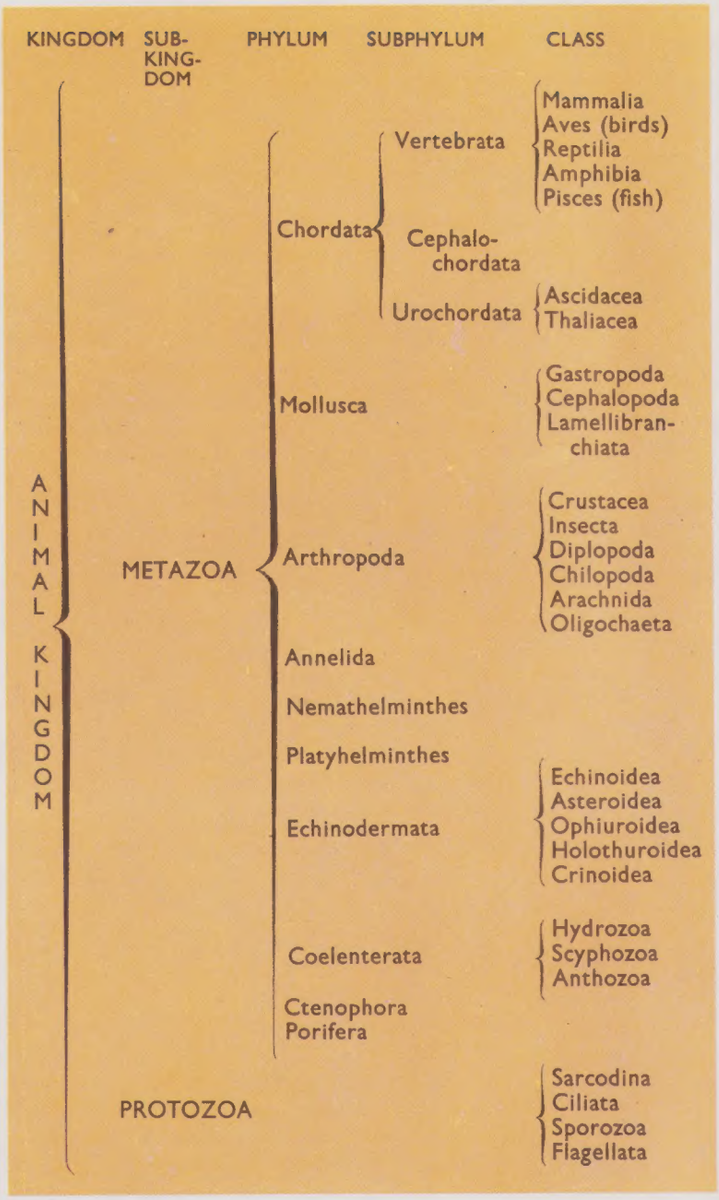
Thus, all tigers belong to a single species, and, since they are a kind of cat, they are put in a genus, *Felis*, with the other cats; so the scientific name of the tiger is *Felis tigris*. All cat-like animals are not put in the same genus (lynxes, for example, are placed in a special genus, *Lynx*), but they are all grouped in a Family called the *Felidae*. This Family is included in an Order, the *Carnivora*, which also includes dogs, weasels, bears, and otters. The Carnivora is one Order of the Class *Mammalia* or mammals, and the mammals are grouped, together with birds, reptiles, fish, and some less familiar animals, in a Phylum called the *Chordata*. This Phylum, together with numerous other Phyla comprising animals with bodies consisting of many cells, makes up the Subkingdom *Metazoa*; the other Subkingdom is the *Protozoa*, and these two together comprise the Animal Kingdom.

Between Class and Phylum there is an intermediate category, the Subphylum. The Phylum Chordata is divided into several Subphyla, of which the most important is the *Vertebrata* (backboned animals); the *Urochordata* and *Cephalochordata* are two less important Subphyla of the Chordata. The table on the right above gives the classification of the Animal Kingdom as far as the category of Class. Only the most important Phyla and Classes are included.

Cocker spaniel

Here is the complete classification of a dog:

Race:	Cocker spaniel
Species:	domesticus
Genus:	Canis
Family:	Canidae
Order:	Carnivora
Class:	Mammalia
Subphylum:	Vertebrata
Phylum:	Chordata
Subkingdom:	Metazoa
Kingdom:	Animal



The Animal and Plant Kingdoms

All living things (apart from viruses) can be divided into two great categories – the Animal and Plant Kingdoms.

As we have seen, the Animal Kingdom is divided into two Subkingdoms, the Protozoa and the Metazoa, words which mean 'first animals' and 'afterwards animals'. The Protozoa were probably the first animals to appear on the earth.

The body of a protozoan animal consists of a single cell; that of any metazoan animal has numerous cells.

Previous page: the classification of the various species of animals is an important branch of zoology. From top to bottom seven Classes of animals: Mammals (raccoon); Birds (yellow bunting); Insects (butterfly); Fishes (catfish); Reptiles (ocellated lizard); Amphibia (edible frog); Arachnida (orb spider)

HENRY IV

'IN the name of Fadir Son and Holy Ghost, I Henry of Lancaster chalenge this Rewme of Ingland and the Corone with all the membres and appurtenances, als I that am discendit by right lyne of the Blode comyng fro the gude lorde Kyng Henry therde, and thorghe that ryght that God of his grace hath sent me, with helpe of my Kyn and of my Frendes to recover it: the whiche Rewme was in poynt to be undone for defaut of Governance and undoyng of the gode Lawes.'

Having spoken these words, as recorded in the Parliamentary Rolls, young Henry of Lancaster was taken by the hand of the Archbishop of Canterbury to the empty throne of England. There, amid wild enthusiasm, he was welcomed as King Henry IV.

Unfortunately for him his predecessor, Richard II, was still alive. For Henry IV was a usurper, the first real usurper in English history. He had come to the throne by force of arms when, after his banishment by the King, he had returned in defiance in 1399. He claimed his inheritance, the Duchy of Lancaster, which had been confiscated by the King, and raised the banner of revolt. The great men of the realm, long angered by Richard's high-handed rule, flocked to his side. Richard was captured, forced to abdicate, and imprisoned in Pontefract Castle. Henry could talk about his descent from Henry III or about Richard's bad government as much as he liked. The basic fact remained that the most powerful of the magnates had supplanted the lawful King. From now on, those magnates who had helped Henry would expect to play an ever larger part in his government. Moreover, the danger of the over-mighty subject now loomed large, for who was to say that such a precedent as Henry had set should not be followed again? In fact, Henry's path to the throne proved a millstone round his neck, and was to prove the undoing of his successors.

CONSPIRACIES AGAINST HENRY

Henry's troubles began almost immediately. In January 1400 there was a conspiracy against him among the personal supporters of Richard. It failed, but the lesson was learned. Richard was too dangerous to live – a natural focus for plots against the new King. The following month Richard was murdered.

But danger threatened from other quarters. France, still of course fighting the Hundred Years War against England, circulated the rumour that Richard was not dead, but hiding in Scotland, France's ally. Already in 1400 an expedition of Henry's against the Scots had failed, and in 1402 they invaded England. But the Scots were routed at Homildon Hill by the Percies – the great northern family, headed by the Earl of Northumberland, whose prestige was dangerously enhanced by this victory.

Danger from Scotland was now negligible, but not so that from Wales. In 1400 Henry had antagonised Owen Glendower, a Welsh gentleman of great ability, who promptly became leader of the general rising of the Welsh. English castles fell into Welsh hands, and three expeditions led by Henry against Glendower failed. In 1403 the Welshmen found allies. The Percies, their ambitions insatiable, made an alliance with the Scots and marched to join Glendower. But they were caught by Henry and defeated at the battle of Shrewsbury, a battle in which Northumberland's son, Harry Hotspur, was killed.

The menace from Wales was still acute, and a further English expedition failed. Glendower now made an alliance with France. French privateers ravaged the south coast, while French troops came to help the Welsh. In 1405 the Earl of Northumberland revolted again in conjunction with his kinsman, the Archbishop of York. They accused Henry of gross misgovernment and usurpation.

But the Archbishop was captured by treachery and beheaded (causing a scandal which reverberated throughout Christendom). The northern rising petered out, and in 1408 the fugitive Northumberland was at last trapped and killed.

CALMER WATERS

By 1408 Henry's position was more secure. The Percies no longer threatened from the north, and France, rent with faction and civil war, could offer no more help to Glendower. Indeed, Henry's redoubtable son, the Prince of Wales, was already showing his military prowess and gaining the upper hand in his battles with the Welsh leader.

Paradoxically enough, Henry's last years, which were free from rebellion and conspiracies, saw his kingship at its weakest. The great magnates were allowed to dominate his councils, and disputes between the aristocratic Beauforts and the Prince of Wales on the one hand and the King's second son, Thomas, and Archbishop Arundel on the other gave a foretaste of things to come for the generation which was to witness the Wars of the Roses.

Henry's weakness in the latter part of his reign was partly caused by poor health. This followed an illness – possibly leprosy – contracted in 1408, just as his worst troubles seemed over.

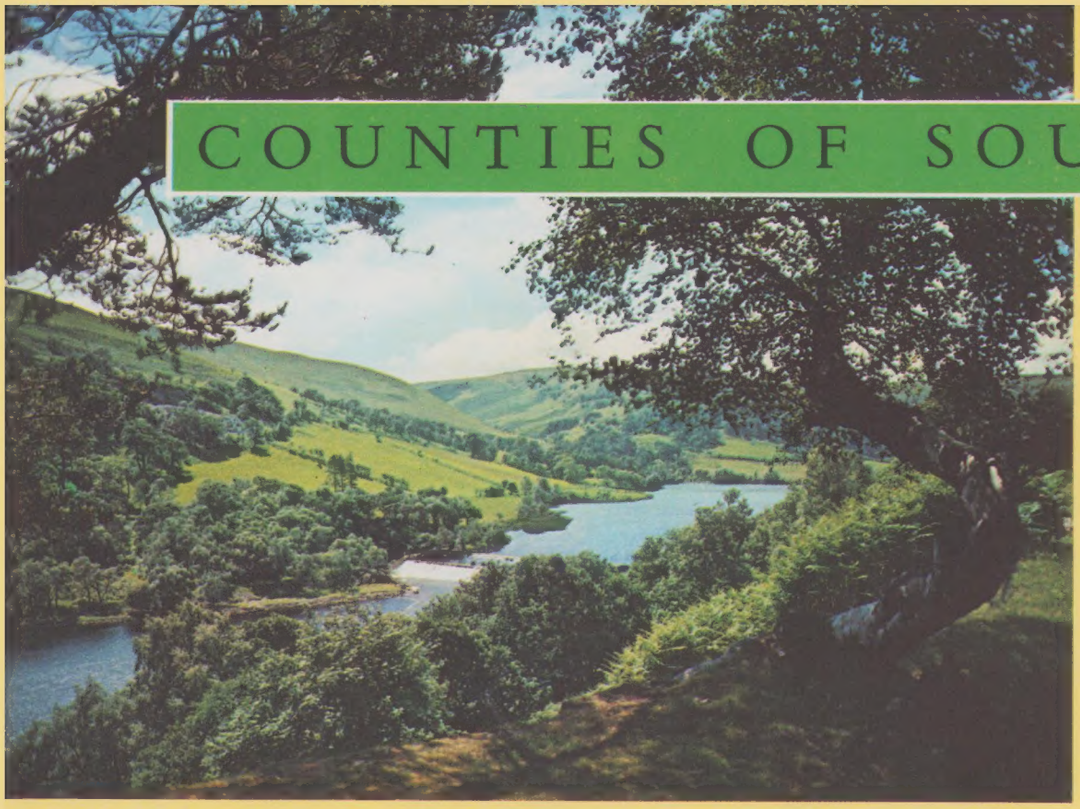
During these closing years England intervened twice in the French civil war. Once the Prince of Wales, on his own authority, sent a small force to aid the Burgundians in their struggle against the Armagnacs. The result was a remarkable victory for the 1,200 Englishmen at St Cloud, but Henry, angered at his son's action, recalled the troops.

It was now the turn of the Armagnacs to bid for English support, and they offered Henry the whole of Aquitaine in return for his aid. In 1412 Henry dispatched a force on these terms, but the campaign proved a complete failure.

Henry died in 1413 at the early age of 46. Few could say that his reign had been a success. Yet he had much in common with another usurper, Henry VII, who is universally acknowledged as successful. Both men were in early years turbulent adventurers, but brought to the throne a common sense and maturity which historians sometimes mistake for a colourless personality. Both men survived almost insuperable obstacles – conspiracies, invasions, rival claimants to the throne. And if their memories are dimmed under the glare of their more spectacular sons, Henry V and Henry VIII, it is certain that without outstanding ability on the part of the fathers the sons would never have reigned.

Henry IV – usurped the crown of England

COUNTIES OF SOUTH WALES



The beautiful Elan Valley on the border between Radnor and Cardigan

THE GREAT INDUSTRIAL REGION

The face of South Wales changed radically with the Industrial Revolution. Until then it had been an agricultural region, although iron and coal had been mined there since the Middle Ages. The iron had been smelted with charcoal, and even as late as the beginning of the 18th century Cardiff was still *importing* coal. But as the Industrial Revolution gathered momentum and iron began to be smelted with coke the potentialities of the great coal measures of Glamorganshire and the surrounding district, allied as they were with iron ore, were developed. The growth of mining and of iron-making drew thousands of people from the rest of Wales and from England. In 1851 there were 951 people living in the two valleys of Rhondda and the Rhondda Fach; by 1901 there were some 114,000. In 1923 the figure had risen farther to about 168,000.

LOOK closely at statistics about Wales and you will find that of the ten largest towns in the country eight are in Glamorganshire and the other two in the neighbouring county of Monmouthshire. Both counties are on the coast of South Wales, in the great industrial region which has an area of only about 1,000 square miles but which contains roughly two-thirds of the entire population of Wales.

In contrast to this crowded area is Radnorshire, also in South Wales, which is the most thinly populated county in England and Wales. Indeed most of South Wales is a region of sparsely inhabited moorland, where sheep are grazed and mountain rivers provide magnificent salmon and trout fishing; large areas have been made into National Parks. The industrial region is based on the minerals found there – notably coal – and row upon row of houses are crowded into narrow valleys, while slag-heaps and coal-tips, cooling-towers and tall chimneys, demonstrate the change wrought by industry on the countryside and the lives of the people.

The counties of South Wales are Pembrokeshire (see page 1118), Cardiganshire, Carmarthenshire, Radnorshire, Brecknockshire (or Breconshire), and Glamorganshire. Monmouthshire is often considered with them too, but we will look at its complicated status later. The counties were given their present form in the 16th century, when England and Wales were united (see page 1804).

The industrial development of South Wales had one fatal flaw. The industries – coal-mining, iron and steel manufacture, tin-plating – were too alike; and the fact that so many people were dependent on one type of industry brought appalling hardships to the people there during the depression between the wars (see page 2644). By the early 1930s two men out of every three who had been employed in the steel industry were out of work; in the Rhondda Valley more than half the miners (over 45 per cent of the working men) were unemployed. Suffering was terrible. The population had been artificially inflated by the demands of industry; and when industry failed the countryside was quite unable to support so many people. Thousands left for the industrial Midlands and for London. Even today the population in many of the industrial towns has not regained its pre-depression level, and in several places it is still falling.

The industrial scene has now changed greatly. Light industries, such as the production of clothing and foodstuffs, have been set up; they now employ more people than coal-mining, steel-making,

Map of South Wales

Radnorshire, the most thinly populated county in Wales

The mountains of South Wales are intersected by broad, fertile valleys ▶

and plating together. It is hoped that by spreading employment over so many different industries the threat of mass unemployment has been averted.

The nucleus of the industrial region is Glamorgan. Four of the other six counties radiate out from it; and where they touch it they, too, are industrialised. Carmarthen produces the finest anthracite in the world, and has steel and tinplate manufactures at Llanelly; optical lenses and bricks are made at Kidwelly. Clothing, clocks, rubber, and machinery parts are made in south Brecknockshire, and quarries provide limestone and silica. Monmouth contains a considerable proportion of the South Wales coalfield, including Ebbw Vale. But the farther away they are from Glamorgan the more truly rural these counties become.

THE COUNTRYSIDE

The mountains of South Wales are not so steep or so magnificent as those of North Wales, and they are intersected by broad, fertile valleys. The Vale of Towy in Carmarthen is one of the richest milk-producing regions in the whole of the British Isles, and it sells milk not only to the great industrial Welsh towns but even to London. Another fertile valley is that of the Usk, which runs through Brecknock and Monmouth, providing good arable land. The climate is mild enough here to allow Hereford cattle to be reared. In the Vale, as the coastal lowlands of Glamorgan are called, dairy farms and market gardens have grown up near the ready market of the industrial towns.

During the 18th century many thousands of cattle – particularly from Cardigan – were driven to London, shod like horses so that they should not be lamed on the roads. Their drovers were highly trusted men, who often carried out important commissions for their employers. But the continual exportation of the best stock disastrously weakened the cattle, and now by far the most numerous animals are the sheep which graze on the short mountain grass.

The rivers of Wales are rich in salmon and trout. The Wye, which forms much of the border between Brecknock and Radnor, is not here the peaceful river that it is in Herefordshire; it is a fast-flowing mountain stream, tumbling over boulders and with treacherous pits in its bed. When Edward II took 3,000 dried salmon from Wales for his Scottish campaign of 1308 a high proportion came from the Wye. On the border between Radnor and Cardigan lies the beautiful valley of the Elan. This was taken over by the Birmingham Corporation at the beginning of the 20th century, and several artificial lakes have been created in the valley to provide water for that thirsty city. Shelley, the poet (see page 3009), spent some months here. He wrote to a friend: 'Nature is here marked with the most impressive characters of loveliness and grandeur. . . . Rocks piled on each other to tremendous heights, rivers formed into cataracts by their projections, and valleys clothed with woods present an appearance of enchantment.'

The coastal towns of South Wales were once important for their coastal trade and for shipbuilding. Today they are only small fishing towns, though some of them are becoming popular as holiday resorts. The coast of Pembroke is particularly lovely, and this peninsula has a mild climate as it is near the Gulf Stream. It is the most fertile part of South Wales, and much of the farming land is under grass or is arable land.

The rugged countryside has prevented easy communications between the people of South Wales, and perhaps because of this Welsh is still commonly spoken in many parts, particularly in the west of the region.

The famous coal-producing Rhondda Valley in Glamorganshire ▶

MONMOUTHSHIRE – ENGLISH OR WELSH?

The exact status of Monmouthshire presents a fascinating problem. Should it be called English or Welsh? No one can really say. Since the Union of England and Wales in the 16th century it has been under the jurisdiction of England, and its assize courts are on the Oxford circuit; but its Members of Parliament are included in the Welsh representation, and it is a see of the Welsh Church.

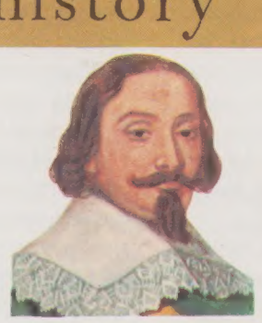
Some statutes of Parliament mention Wales and Monmouthshire, which would suggest that Monmouthshire is part of Wales; but a statute of 1844 mentions the six counties of South Wales, and firmly leaves Monmouthshire out. Today it is regarded as part of Wales for administrative purposes; and historically and geologically it can also be regarded as part of Wales. This curious state of affairs is reflected in the county's arms; the supporters are the Welsh dragon and the English lion, and the motto is: 'Faithful to both.'

A consignment of convicts arrives in Australia –

AUSTRALIA: history

IN 1629 a great Dutch ship, the *Batavia*, was wrecked on a treacherous coast. The captain left a detailed account of his adventures, which included a description of 'a species of cat whose forepaws are very short and hind legs long and it walks on those alone'. The coast was that of western Australia – and the animal? You can probably guess – the Australian kangaroo!

Shipwreck was quite a common experience for those who ventured near the *terra australis* (southern land) as it was known. It was the last great land mass to be discovered by Europeans, and was probably first seen by European eyes around the beginning of the 17th century. But few wished to venture deep into the interior. The coast was treacherous, and one early explorer wrote about the northern parts: 'This is the most arid and barren region that could be found anywhere on earth; the inhabitants, too, are the most wretched and poorest creatures that I have ever seen.'



Abel Tasman

James Cook

However, the Dutch took quite an active interest in Australia. In 1642 a Dutch expedition, planned by Anthony van Diemen, Governor-General of the East Indies, set out, under Abel Tasman, to penetrate to the South Seas. Tasman took possession of Tasmania as well as reaching New Zealand.

A 19th-century family of colonisers sets out to make a new home

In 1688 an Englishman, William Dampier, first arrived in the north-west; his accounts aroused much interest. However, in 1770 another Englishman, Captain James Cook (see page 904), landed in the east, in a bay which had so many hitherto unknown plants that it was called Botany Bay. Cook claimed much of eastern Australia for the Crown and gave the area the name New South Wales. In 1786 the British government decided to make Botany Bay a convict settlement, and in 1788 the first convict consignment arrived there under Captain Arthur Phillip, the first governor. He soon moved the settlement to a place where Australia's largest city, Sydney, now stands and also claimed the island of Tasmania and half of the mainland of Australia for Britain.

Political map of Australia; on the left the Australian flag

modern Australia began as a convict settlement

The early years of the colony were unsettled, but it soon became clear that the fine, agricultural land had much more potential than just a penal colony. Extensive settlements began, not only by ex-convicts but by other settlers as well. In 1813 a way was found through the Blue Mountains, which hem in the coastal plain of south-eastern Australia. Great areas of pasture stretching out into eastern Australia were revealed – pastures which were to support the famous Australian sheep. And so the tempo of settlement increased even more.

In 1851 gold was discovered. In 10 years the population of Australia doubled as people rushed in from the outside world in search of quick riches. Needless to say, many were disappointed in the gold rush, but many stayed on to farm this exciting and challenging country.

in the interior of Australia

During this period of expansion Australia was beginning to take political shape. Other colonies appeared besides the parent colony of New South Wales: Tasmania, Western Australia, Southern Australia, Victoria, and Queensland; they developed rapidly towards responsible government.

The second half of the 19th century saw first expansion and then consolidation. But throughout the 19th century one could not talk about a united state of Australia. It was essentially a collection of separate colonies governed from London.

Commonwealth of Australia

In 1901 the colonies became states and united in the Commonwealth of Australia. The Australian Parliament was given the power to make laws on important matters like defence, trade, and relations with other countries. In 1927 the Federal Parliament was transferred from Melbourne to Canberra, the national capital.

In 1914 Britain went to war against the Kaiser's Germany. Australia immediately handed over her navy and an expeditionary force to support the allied cause. In the Great War Australian and New Zealand troops distinguished themselves by bravery of the highest order.

The war had helped to develop Australia's heavy industries, and afterwards she began a period of economic expansion. Immigration from Britain increased, and Australia's population rose from 5 to 6 million between 1918 and 1926. In the 1930s Australia suffered a severe economic depression. She had hardly emerged from this when the Second World War broke out. Again Australia sprang to the support of her mother country.

The severest crisis

In 1941 Japan entered the war and Australia was faced with the most severe crisis in her history. The American General MacArthur was appointed Supreme Commander in the south-west Pacific, with his headquarters in Melbourne. The Japanese never succeeded in invading Australia, and their few attempts to obtain a foothold were effectively beaten off. It was from Australia that MacArthur began his successful counter-offensive against the Japanese, and helping him in it were over 200,000 Australian troops. But it is interesting to note that an equal number of Australians were employed fighting in other parts of the globe.

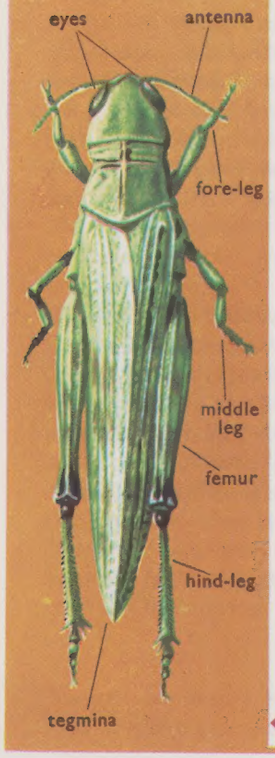
Common Market

After the war the economy of Australia began to expand again. In 1955 the millionth post-war immigrant arrived, and by 1959 the population had reached 10 million. In 1949 Robert Menzies became Prime Minister and he made Australia's voice heard not only in the affairs of south-east Asia but in the whole world. However, a fly in the economic ointment appeared in 1961 with Britain's application to join the Common Market. Britain's entry would mean that European goods would have preferential treatment in British markets, and this could be a serious blow to Australia's economy. Britain failed to get into the Common Market, but there was much talk in Australia about the effect of Britain's action on the welfare of a Commonwealth of which Australia had so long been such a loyal and prominent member.

THE ORTHOPTERA (part two)

'AND the Lord said unto Moses, Stretch out thine hand over the land of Egypt for the locusts, that they may come up upon the land of Egypt, and eat every herb of the land, even all that the hail hath left. And Moses stretched forth his rod over the land of Egypt, and the Lord brought an east wind upon the land all that day, and all that night; and when it was morning, the east wind brought the locusts. And the locusts went up over all the land of Egypt, and rested in all the coasts of Egypt: very grievous were they; before them there were no such locusts as they, neither after them shall be such. For they covered the face of the whole earth, so that the land was darkened; and they did eat every herb of the land, and all the fruit of the trees which the hail had left: and there remained not any green thing in the trees, or in the herbs of the field, through all the land of Egypt' (*Exodus* x, 12–15).

This passage from the Book of Exodus shows clearly why ancient peoples dreaded the plague of locusts. In those days people were utterly helpless against the swarms of devouring insects that descended on their fields and crops and orchards. Locusts are still a serious menace, but, through knowledge of their breeding grounds and of poisonous chemicals that can be used to kill them, modern man is far less at their mercy than were the Ancient Egyptians.



A Mediterranean locust, with closed wings

THE SHORT-HORNED GRASSHOPPERS

The short-horned grasshoppers that chirp in our hayfields and the large tropical and sub-tropical locusts are all members of the Family Acrididae of the insect Order Orthoptera. We dealt with the other Families of this Order on page 3047.

The antennae of the Acrididae are short, not long or threadlike; otherwise they resemble the other Orthoptera in having long, powerful hind-legs and strong jaws. Both sexes stridulate by rubbing the femur of the hind-leg against the fore-wing, but the males do so far more actively. The hearing organs of Acrididae are at the base of the abdomen. As in other orthopterans, the young grow gradually, without larva and pupa stages; only the adult has fully developed wings. Young locusts are called hoppers, and they can do a great deal of damage. Locusts are exceptional among the Orthoptera in being strong fliers; a swarm of them may fly continuously for a whole day and cover several hundred miles.

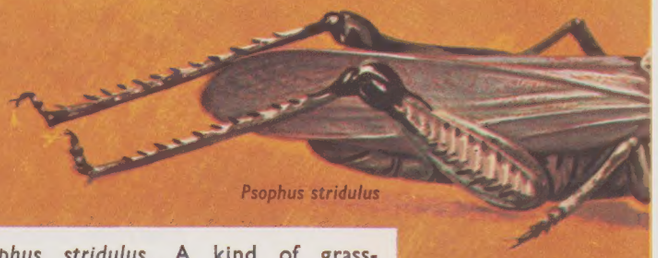
SWARMING

The most important characteristic of the locusts is their tendency to form huge swarms, which migrate over long distances devastating the vegetation in their path. Most of the time, however, the locusts exist in relatively small numbers and do little harm. The swarms usually start in certain regions called 'outbreak areas'; knowledge of their location is very important in locust control. It is a remarkable fact that individuals from a locust swarm differ from those of the same species living a solitary existence.

Mediterranean locust

Mediterranean locust (*Dociostaurus maroccanus*). This is a small locust, rather over an inch in length, which inhabits North Africa and the countries of southern Europe. In spite of its small size, swarms of this locust may do immense damage; in 1929, in the Italian province of Foggia, 3,000 tons of locusts were killed – an estimated number of about 100,000 million insects.

The Mediterranean locust is a rather squat, thick-set insect and varies in colour from green to brown. Each female lays about 140 eggs.


Psophus stridulus

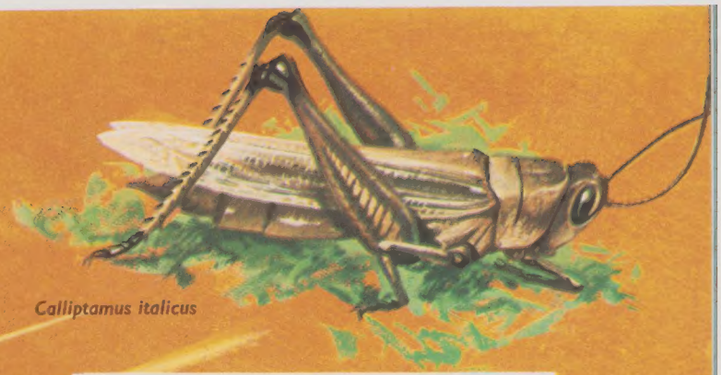
Psophus stridulus. A kind of grasshopper found over a large area of Asia and Europe, though it does not range as far north as Britain. It has no tendency to form swarms and so does no serious harm to agriculture.

Egyptian locust

Egyptian locust (*Anacridium aegypticum*). This is one of the largest locusts; the females may be 3 inches in length, but the males are only about half this size. It is found in all the countries around the Mediterranean. Fortunately this big insect does not form swarms but lives in small numbers in wild and sparsely cultivated areas and is not harmful in any way. It is a dull-coloured insect, greenish or brown, and so well camouflaged among rather dry vegetation.

Occasionally specimens of this locust are found in Britain among imported vegetables, but they cannot survive long or breed in this country.

Desert locust (*Schistocerca gregaria*). This is one of the most damaging of all the locusts because it forms huge swarms in any part of its range – that is, it has no special 'outbreak areas' where a watch can be kept and measures taken to destroy the swarms before they start to migrate. This is a large species – as big as the Egyptian locust – and extends from the northern half of Africa across Arabia and Persia to India.



Calliptamus italicus

Hopper of the desert locust

Calliptamus italicus. Only one species of locust is really feared in southern Europe, and that is the Mediterranean locust that we have already described. *C. italicus* also does some damage to agriculture, but only on quite a small scale. It is rather small; females are just over an inch long and males just under. It ranges up in the mountains to levels of over 6,000 feet.

Migratory locust

Migratory locust (*Locusta migratoria*). This is another species that forms swarms and does immense damage. The swarms originate in definite 'outbreak areas', usually deltas of rivers surrounded by semi-desert. In the solitary condition the hoppers are dull brown or green, but swarming hoppers are brightly coloured – black with orange spots. Swarming adults have longer wings than solitary ones.

Long-nosed grasshopper (*Truxalis nasuta*). This queer-looking grasshopper is common in the countries around the Mediterranean. Its head is drawn out into a point; the eyes and antennae are near the tip and the mouth farther back. The insect may be green or brown, and when it sits among vegetation, with its antennae stuck straight out in front, it looks just like a blade of grass. It is quite harmless.

Oedipoda germanica and *Oedipoda coerulescens*. Both these grasshoppers are found in Europe. Their bodies and fore-wings are coloured to match their surroundings, but both have brightly coloured hind-wings – *O. germanica* red and *O. coerulescens* brilliant blue. When the insect flies a bright flash of colour suddenly appears, and disappears as it alights. This 'flash coloration' is believed to confuse enemies such as birds and lizards.

Oedipoda germanica

Long-nosed grasshopper

THE immense triangle of the South American continent extends from within the northern tropics, south through the southern tropics and the southern temperate zone, to almost within ten degrees of the Antarctic Circle at its cold southern tip. The mouth of the Amazon lies along the Equator, while the Magellan Strait lies at the same latitude in the southern hemisphere as the British Isles do in the northern.

Within this wide climatic range there is a great variety of flora and fauna.

A map of the native animals of South America

The four regions into which South America can be divided

An isolated fauna

The animals of South America are very distinct from those of North America, Europe, and Asia. South America is now joined to Central and North America by the isthmus of Panama, but this joining up is geologically recent. From about 60 million to 1 or 2 million years ago – that is for the greater part of the Tertiary or Cenozoic era – South and Central America were separated from North America by sea, the division being much farther north than the present position of the isthmus. In this great isolated continent a peculiar assemblage of animals evolved, many of which became extinct, but a number of relics of them still remain, including the American marsupials (see page 2801) and the armadillos, sloths, and anteaters, which we have already described on page 2785. Shortly before the Ice Age, 1 or 2 million years ago, this southern continent became joined to North America, and some northern types of animals migrated into it. This explains the presence of the puma and several kinds of deer in South America.

FACE TO FACE with the

LOCH NESS MONSTER

THE Professor's voice was high-pitched and self-confident. It had a preciseness gained from a life-time spent in university circles. Just at this moment he was indulging in his own peculiar brand of academic humour, much to the annoyance of the fair-haired young man who was sitting impatiently on the edge of a chair.

'What an original suggestion, my dear Carter,' said the Professor. 'A monster in Loch Ness. I wonder why no one has thought of it before. And how do you imagine it has survived there for so long? Perhaps it has discovered the secret of eternal youth. Or perhaps there is a tribe of monsters there. How delightful. No doubt we scientists have overlooked the simple explanation as to how they got there, or, indeed, why they put in such infrequent appearances. . . .' He paused to puff at his large Bavarian pipe.

What an old fool, thought John Carter angrily, as he eyed the man who had once seemed so receptive to new ideas. I suppose his Nobel Prize has made him feel infallible.

'Look, Professor,' said John. 'You know me. You were once my tutor. I've always been perfectly sane. It may sound absurd—but I believe in the thing. It won't mean much to you, but a few months ago I visited an old friend in Scotland. Well, he was more than just an old friend. He used to be my guardian when I was a boy, and looked after me till I went to school. He taught me everything that is dear to me now—love of nature, the open air, the countryside. He was the finest man I have ever known. When I last saw him he was dying. He was an old man, but a healthy one. I am convinced that his death was hastened by some kind of shock. And a few nights before he died he told me something I shall never forget.'

The Professor had ceased to look amused. He was undeniably interested.

'It was something he saw one night in Loch Ness. Something so terrible that it killed him. He described it to me so vividly and in such detail that I know it was more than a mistake or some haliucination.'

The Professor lit his pipe again and sucked at it deeply. 'What was it your friend described?' he asked.

'It was a plesiosaur,' said John simply.

The Professor's expression did not change. 'You realise that the plesiosaur became extinct over one hundred *million* years ago don't you, Carter?'

'Yes, of course,' replied John. He was now searching in his brief-case. 'Look at this. Here's a sketch I've drawn. It shows how a plesiosaur *could* survive. You see, it is possible that some kind of cavern could be connected with the loch—a cavern far older than the lake itself. There could even be other creatures down there, relics from the same age.'

The two men looked at each other. John stood up. 'Well, thank you for sparing me your time, Professor. I am sorry you are not interested in my project. Your knowledge would have been invaluable. I would be grateful if you would not mention this to anyone.'

Professor Middleton moved round to the door and turned the knob.

'Well, thank you for coming, Carter. I promise I won't say a word about it. Oh! by the way, you do me an injustice; I am interested in your project, and what is more I intend to come with you.'

IT was a freezing January night. Inside the tiny, lakeside cottage John Carter and his 17-year-old brother Alan were making their final preparations.

'That's everything then,' said John. 'Diving gear, lamps, intercom, and a revolver for you—you're a better shot than me. Professor Middleton should be here any minute.'

'Pity we have to choose the night, for secrecy,' said Alan. 'It makes the thought of Loch Ness seem even colder.'

Just then a car drew up. Professor Middleton appeared at the door. Not the sleek academic of a week ago—but a determined-looking old man, wrapped in a large college scarf, his white hair blowing in the wind that howled and buffeted outside. He looked slightly apologetic.

'I'm afraid I've had to bring someone else, John,' he said. 'A man called Price, my laboratory assistant. He found your sketch-map and notes. He rather forced himself on me. I hope you won't mind an extra person, and he's brought a frogman's suit with him.'

At that moment Price entered. He was a round-faced, fat American of about 30, with an oily grin. John felt an instinctive dislike for him. He spoke with a rather affected Bostonian accent.

'I hope you don't object to an intruder—but I'd hate to miss out on a show like this.'

'Well, there's not very much we can do about it,' said John. 'Now I'd better put you all in the picture. We've chosen this spot because this is where my guardian, Robin MacIntosh, saw the plesiosaur. If it *did* come from some underground cavern the entrance will probably be somewhere around here. We'll have to investigate the side of the Loch most carefully. The entrance may not be at all large. We'll go in 25 yards apart. We'll communicate over the intercom—but don't say anything unless it's worth saying.'

The four changed silently into the dark-blue frogmen's suits. John could not help smiling at the sight of the Professor clambering into his science-fiction outfit.

WHEN they went to the side of the Loch the waters were black and forbidding. As the other three dispersed to their stations along the edge of the Loch, John fastened his helmet and checked his radio, oxygen, and the flashlight in his helmet. Then over the radio he gave the signal for the four to descend into the depths of Loch Ness.

At this point the Loch sloped very steeply and then dropped sheer to the bottom. John's flashlight hardly seemed to penetrate the black, inscrutable water around him as he descended. Down he went; down and down for what seemed an eternity. For the first time he felt frightened. Was he mad? What if there *was* a monster there? Supposing he came face to face with it? Suddenly he felt something under his feet. It gave beneath him in an unpleasant, rubbery way. He gave an involuntary shudder. Then he smiled to himself. Mud! He had reached the bottom.

'Hello, John here,' he called over the intercom. 'Are we all on the bottom?'

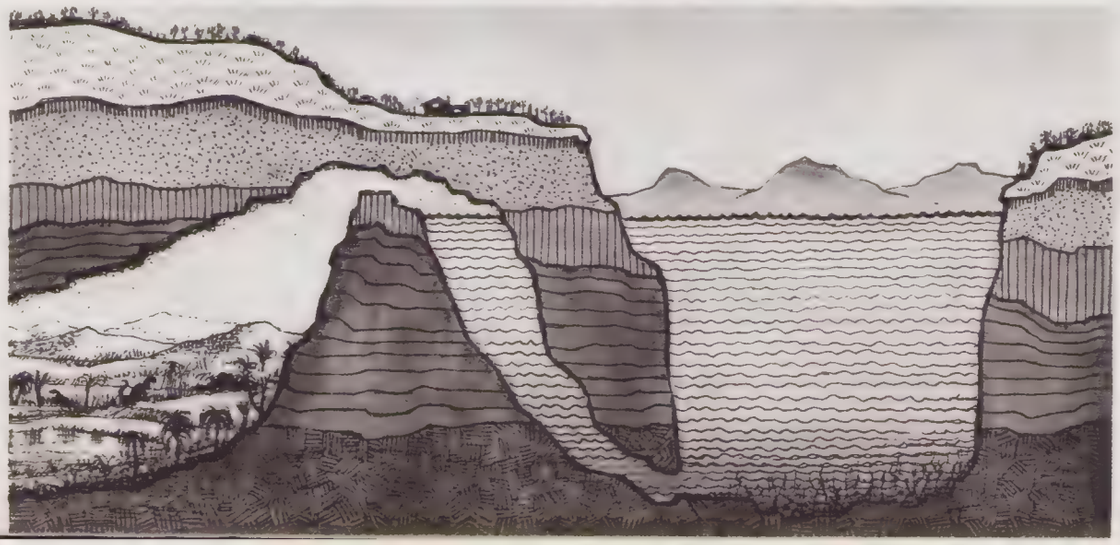
'No, still diving,' came the reply from all three. Strange, thought John to himself. He must be on some kind of shelf. He groped his way towards the side, expecting at any moment to bump into the sheer face of the Loch wall. But nothing happened. He continued to move unimpeded into what he could only think of as being a large opening in the side of the Loch.

Could this be the entrance to the cavern? thought John. Could he have stumbled on it in his first dive? As he advanced farther his light seemed feebler than ever. Now no little fishes darted across his path; no weeds floated past. Then he realised that he must be well inside the wall of the Loch.

He broke the silence over the intercom.

'All of you—come immediately to where my light is flashing.' He returned to the mouth of the cave. Within ten minutes he had been joined by three other ghostly figures, their heads ringed by an unearthly green halo from their flashlights.

He turned again up into the cave—followed by the others. With every yard their excitement increased. This was a passage exactly as John had predicted. But would it just end in a blank wall?



ON they went, able to see only a few feet in front of them. The strain on their eyes was causing strange effects; dancing lights appeared before them. Once John thought he saw a dark shape moving ominously in front of them. Almost as he saw it he was startled by an ejaculation from Alan.

'Hey! We're rising. Look at your altimeter!' John looked at the instrument strapped like a watch on his wrist. Alan was right. They had been steadily rising. John looked upwards and said incredulously, 'It seems to be getting brighter!'

They all peered upwards, and sure enough the dense black was giving way to clearer water. Far above them there appeared to be a faint, greenish-yellow glow. They surfaced to find themselves near one of the banks of a large, circular lake perhaps a mile or so in diameter. Making for the side they climbed eagerly on to the rocky shelf bordering the water and scrambled to their feet.

The air was very still and hot; the atmosphere wet and humid. Above them shone an eerie, phosphorescent light. They gazed in wonder at the scene before them. It was Alan who voiced all their thoughts. Almost to himself he whispered in an awed voice, 'A lost world.'

'Yes,' said John slowly. 'And we've found it.'

The Professor was looking raptly around him: 'Tree ferns, cyads, ginkgos, horsetails . . . this forest is a hundred million years old.'

Price's voice brought them back to reality with a jerk.

'Gee! This is fantastic. Wait until the press gets hold of it. We'll be as famous as if we had hit the moon.'

John turned on him angrily:

'No one is telling the press, not yet at any rate. What's more, no one is going back till I say so.'

While they had been talking they had become aware of a low, confused hum or murmur, which did not seem to come from any particular direction. They listened.

'What is it, Professor?' asked John. The Professor thought for a moment or two; then he said:

'Insects. Millions of them, and perhaps also all manner of creatures known only to us as fossil relics. We are listening to jungle sounds as they must have been on earth millions upon millions of years ago.'

'Let's go back,' said Price. 'If there are million-year-old insects, there are million-year-old monsters. And by crikey, I don't want to meet up with one.'

The Professor eyed him with contempt.

'Go back if you like,' he said. 'But we're going on.'

They took off their diving-suits. Alan had been examining the phosphorescent light, which seemed to come from a roof about 500 feet above them.

'How do you explain that light, Professor?' he asked.

'I don't, Alan. Radioactivity? Or the roof of the cavern could be encrusted with billions of phosphorescent creatures which appeared relatively early in the earth's history.'

THE four set out into the eerie forest. The soil was black and spongy. Occasionally there were clusters of gloriously coloured flowers. The Professor was beside himself with excitement. His voice had gone up another octave.

'These flowers,' he explained, 'were probably the earliest to appear on earth. Some of them resemble the modern lotus except that they are much larger and their petals a delicate shade of blue.'

Other flowers they instantly recognised as dogweed and magnolia. As they went on, the swarms of bees and flies became more numerous, and odd-looking beetles and enormous spiders scurried over the ground.

Some of the trees had very short trunks with criss-cross markings like those of palm trees. Others had a thick crown of beautiful, sword-shaped leaves hanging down almost to the ground. The Professor pointed to one.

'This is the ginkgo, or maidenhair tree, which still grows in China and Japan, where it is regarded as sacred.' At intervals they would see much larger trees of enormous girth rising 200 feet far above the ferns, which dominated the forest. The Professor described these as ancestors of the giant sequoia or redwood trees found in North America.

WHILE the Professor had been speaking, Alan had gone on ahead. Suddenly he uttered a short cry and stood stock still, his eyes riveted on something deep within the jungle.

'What's the matter?' called John, hurrying towards him. Alan, clearly in a state approaching terror, began to back away, beads of perspiration standing out on his forehead. He raised a quivering hand and pointed to the trees.

'It moved.' His voice was half-whisper, half-sob. 'The tree moved itself deliberately.'

The others stared into the forest and there, before their eyes, they saw a great, tree-like column swaying from side to side in a series of loathsome jerks. John put an instinctive, protective arm around his brother. But the Professor, cautiously, yet otherwise unconcerned, was moving through the trees in the direction of the gruesome spectacle. He turned and came hurrying back to the others.

'It's all right, it's all right,' he called out. 'It's nothing to be alarmed about. It's not a tree at all. It's the neck of some huge reptile with its head in a clump of foliage.'

'Heavens,' gasped John. 'Hadn't we better run for it?'

'Of course not.' The Professor was completely composed. 'This is a plant-eater. Almost certainly a brachiosaurus. There *were* carnivorous dinosaurs, but this one would not be interested in us. In any case it is buried up to its shoulders in a swamp, and as it weighs about 50 tons and has somewhat inadequate legs, it would be a very poor performer on dry land. What's more it has got such a tiny brain that even if it saw us it would take it a considerable time to appreciate the fact. Oh no! We're safe enough.'

John was amazed by the Professor's *sang-froid*. He seemed to have blithely accepted the fact that they had to all intents and purposes gone back millions of years.

'Unquestionably our lost world resembles that which we call Mesozoic, which was in full swing 150 million years ago,' went on the Professor. He added with some relish: 'That means we are in the age of giant reptiles.'

'Look, Professor,' broke in John. 'I don't want to seem a spoil-sport, but is this getting a bit dangerous? I know it all seems like a dream and we're going to wake up any moment. But that brachiosaurus was pretty real. If not a brachiosaurus, why not a megalosaurus or a tyrannosaurus? I shouldn't like you or Alan to be a dinosaur's dinner.'

Price had been fidgeting while Alan spoke. As soon as he opened his mouth it was obvious that he had lost his nerve.

'I'm not going to be a dinosaur's dinner either. By crikey—I'm getting out now. This place is dangerous.' His voice trailed off incoherently, and before anyone could stop him he began to run back the way they had come, still shouting hysterically.

'BETTER leave him,' said the Professor. 'He'll find his way back. That's the last time I

ever take on anyone from Harvard. Anyway I agree with you, John. I think we ought to be getting back.'

'OK,' said John. 'But first can we go and see what is over there?' He pointed to an area to their right where the trees thinned out rapidly and chinks of light showed between them.

'By all means,' replied the Professor.

They pushed their way through the panoply of leaves and branches. Alan, who had scrambled ahead, called out:

'I can see water through the trees.'

Soon they had emerged through the dense jungle of vegetation to find themselves standing on the edge of a large, oval lake which could not have been less than 5 miles long.

What they saw was the most fantastic sight ever witnessed by man. It was the scene of indescribable activity. The water was alive with movement. Great shoals of fishes swam just below the surface, accompanied by weirdly shaped reptiles scything through the water in a series of coils, like half-submerged rubber tyres. Overhead, scores of creatures swooped and glided with beats of bat-like wings. They were not birds. Instead of beaks they had elongated jaws with rows of formidable-looking teeth.

The three were speechless. No word in the human vocabulary seemed adequate to describe the scene. The Professor was first to speak, as 100 yards away one of the huge, winged creatures swooped into the lake and emerged with one of the myriads of fishes in its beak.

'A pterosaurus,' he said in a hushed voice.

Near to them they could see an oddly shaped fish, some two feet long with four arm-like fins.

'That's a coelacanth,' said the Professor. 'People used to think it became extinct over 70 million years ago, but a number were discovered recently off the coast of Madagascar.'

Along the bottom was a mass of wonderfully shaped sea-shells, mingled with beautifully coloured sponges, starfish, and sea-urchins. The sea-urchins were particularly striking, some of them resembling studded jewels and precious stones in a variety of greens, yellows, and mauves. Floating on the surface were curious cup-shaped flowers with long stems dangling deep into the water. The extraordinary thing about them was that they seemed to be consciously swimming together in a shoal. The Professor explained that these crinoids, as they were called, were classed as animals and not plants.

THEY stood, spellbound, as prehistory unrolled itself before their incredulous eyes. But the spell was rudely broken. A terrible crashing noise had suddenly begun to fill the forest. It sounded as if a giant was bludgeoning his way towards them. Before they had time to be terrified, a colossal 20-foot-long animal exploded into view. Its body was arched in a great curve. Its small head was held low to the ground. It was covered with large, triangular bony plates. But it was not this hideously armoured apparition that was making the crashing noise. Something was coming behind it—something huge and terrible—something that was making it flee. Then a 6-foot, lizard-like animal raced in front of them. It stopped dead in its tracks and lay motionless. For just behind it towered the most hideous animal that has ever walked the face of the earth—a tyrannosaurus. It stood erect on enormously thick hind-legs. It was about 20 feet high. Its stone-coloured, lizard-like body was crowned by a massive head from which protruded monstrous jaws armed with colossal dagger teeth.

As repellent as its vast bulk were its tiny, almost deformed arms, no bigger than a child's, with only two stunted fingers.

The three lay motionless by the lake, not daring to move but unable to take their eyes off the terrible sight.

The awful reptile moved its giant head slowly from side to side, seemingly oblivious of the terrified animal cowering beneath it. They could see its eyes scanning back and forth. Would it see them? Alan closed his eyes.

Suddenly it made a swift plunge, dropped its head at astonishing speed, grasped the struggling reptile in its jaws, and bore it off triumphantly into the forest.

THE three men lay very still. John's heart seemed to be going like a pneumatic drill. Then the Professor, his voice hoarse and unnatural, said:

'There could be hundreds of creatures like that farther into the forest. Let's get back as quickly as we can.'

They retraced their steps. The forest seemed deadly quiet now. After they had walked for about a quarter of an hour, the Professor broke the silence with a nervous laugh.

'Well, John. That was a zoology lesson you won't forget. Did you recognise the main actors?'

'The brute was a tyrannosaurus; the armour-plated thing was a stegosaurus. But I couldn't tell you what that unfortunate lizard was.'

'That was a camptosaurus. And if you want to continue the lesson, on your right you can see the first true bird—the first animal to grow feathers—the archeopteryx.' The Professor pointed to a large, exquisite bird, with brilliantly coloured feathers, eagle-like wings, and a great plume extending behind it.

Much sooner than they expected, they saw they were nearing the lake.

'I wonder where Price is,' said Alan.

'Probably back at the cottage—drinking my whisky,' said the Professor. 'I suppose I can't very well sack him for refusing to face up to a tyrannosaurus.'

SUDDENLY, for the first time, they began to think of the world outside. Not far away, they knew, the wind was whipping up the black waters of Loch Ness.

John voiced all their thoughts when he spoke:

'I think this world should remain a secret for the time being. Perhaps some day we'll come back. But we must make sure that only responsible people will enter: no reporters, or publicity-seeking scientists like Price.'

The others nodded. In another five minutes they had reached the edge of the lake.

'Well, I hope our diving-suits are still there,' joked the Professor. 'And they haven't become a dinosaur's dinner. . . .' His words trailed away. Lying by the lake, 25 yards from them, was the body of Price. And above him reared a grotesque, black neck emerging from a vast body and paddle-like limbs which lay in the shallows. There could be no doubt about it. It was a plesiosaur—the Loch Ness Monster itself. And it had seen them. Its fierce, serpent eyes were fixed on them. It swayed its neck, and writhed and wriggled menacingly in the water.

'It's coming for us,' yelled John. 'Alan, your revolver. Shoot!'

Alan dragged the revolver from its holster. He fired once from the hip; then fired again with his arm extended. The second shot hit its mark right between the monster's eyes. The monster blinked. The swaying stopped, and there was a moment's silence. Then a great tail arched out of the water about 50 feet from the creature's head. It descended with a crash that sent water spraying high into the air. Then as it rolled and threshed in the violence of its death-throes, the lake became a cauldron of tumbling water and spray.

Suddenly all was still. The monster lay motionless and dead, floating helplessly on the surface.

IT was dark when the three men arrived back at their cottage. They had been away little more than 12 hours; yet had seen things they would talk about with each other for the rest of their lives.

The Professor's first move was to fill three glasses with whisky.

'I suppose,' said John, 'You might say we've solved the mystery of the Loch Ness Monster.'

'I would say even more,' replied the Professor thoughtfully. 'That may have been the last of the monsters. Those which entered into Loch Ness must have done so in a desperate search for food, and I'm sure they could not have survived in the cold water. So I would say, Alan, you probably have the rather doubtful distinction of killing the last of the plesiosaurs. I doubt whether we'll be reading very much more about the Loch Ness Monster in our newspapers.'

THE END

Announcement for readers of **BLACK** *Knowledge*

AVAILABLE NOW—

The Standard Binder for Volume 17 (issues 193-204)

&

The Easibinder for Volumes 17 & 18 (issues 193-216)

The Easibinder has 24 extra rods. These are for the new series of cover articles on the 'Highlights of this Century'

The Standard Binder for Volume 17 and the Easibinder for Volumes 17 & 18 are available *now*. The Standard Binder for Volume 17 contains issues 193 to 204 and costs 4/6. The Easibinder for Volumes 17 & 18 contains issues 193 to 216 **together with the series of 24 cover articles on the 'Highlights of this Century';** it costs 15 -.

Both these binders can be obtained from your newsagent. In case of difficulty write to: Department B, 37 Hertford Street, London W.1., sending a cheque or postal order for the required sum. (There is a 1/3 charge for postage and packing on each order from Department B—but more than one binder can be obtained for the same charge.)

HIGHLIGHTS OF THIS CENTURY

A new series of cover articles

Cover articles 193 to 216 will consist of a series of absorbing features on the 'Highlights of this Century'. Carefully selected and fascinating photographs, newspaper cuttings, and paintings will be linked by a brief and informative text written by a historian who is an expert on the period. This will be history as it really happened—as seen and recorded by the people of the time—and you will encounter all the personalities and events that shaped our era. In these 24 articles the fascination, tragedy, and triumph of this most significant century will be revealed. Such an approach to the history of our times will be quite unique, and you should certainly wish to keep this valuable record.

BINDER FOR HIGHLIGHTS—available now!

A handsome binder for the 'Highlights of this Century' can be obtained *now* either from your newsagent or direct from Department B, 37 Hertford Street, London W.1. The binder contains 24 strings. To insert the articles you will have to cut the tops off—as with the previous cover articles. The binder costs 4/6. If obtained from Department B there is a 1/3 charge extra for postage and packing—but more than one binder can be ordered for the same charge.

N.B. If you are an Easibinder collector you do NOT need this binder because the Easibinder for Volumes 17 & 18 has 24 extra rods.

EXCITING NEW ARTICLES

As well as the usual articles, the new volumes will contain many exciting new departures. We are having a series of 24 cover articles on the 'Highlights of this Century'. And also in each issue there will be a number of valuable reference charts. As well, there will be a number of articles on the latest scientific topics, religion, art, and some of the not-so-well-known aspects of the history and affairs of many different foreign countries.

USEFUL CHARTS

Issues 193 to 216 will each contain part of a series of reference charts. You will find these invaluable not only at school but in later life as well. They include a complete history of the world from 5,000 million years ago, which takes in geology, zoology, anthropology, politics, science, and culture. Moreover, there will be separate charts on science, religion, painting, literature, music, sculpture, and many other subjects as well. These charts will form an integral part of each issue, so you will not have to detach them from the rest of the encyclopaedia.

Published by KNOWLEDGE PUBLICATIONS. Printed by L.T.A. ROBINSON LTD., London S.W.9

SOUTH AMERICA: flora and fauna

Four distinct regions

From the point of view of its geography we can divide the South American continent into four main regions.

1. The great chain of mountains called the Andes, which faces the Pacific Ocean on the western side of the continent.
2. The equatorial region, the greater part of which consists of the basins of the Amazon and Orinoco rivers.
3. The mountainous eastern central region of Bolivia and Paraguay, known as the Gran Chaco.
4. The temperate region, south of the tropics, which consists mainly of the Argentinian pampas.

A fifth, much smaller, region is the narrow strip of desert running along the coasts of Peru and Chile between the Andes and the sea.

THE ANDES. This great mountain chain extends unbroken for over 5,000 miles from the Caribbean coast in the north to the southern tip of the continent. Large areas lie above the tree line and consist of cold, barren lands called *paramos*. Here the vegetation is low-growing plants, mosses, and lichens, and resembles the tundra of sub-arctic regions. Not many animals can live at these great heights, but the hardy mountain people keep llamas and alpacas in domestication. These are closely related animals; the llama is used mainly for carrying burdens and the alpaca for its wool. Two wild animals of the same type live in the mountains: the guanaco (of which the llama and alpaca are domesticated races) and the vicuna, which is smaller. Another well-known animal is the chinchilla, a small rodent whose fur is very valuable. Nowadays most chinchilla fur comes from animals kept on farms in Europe and North America. The rare spectacled bear is found on the lower slopes of the Andes. In the forests grow the familiar araucaria or monkey puzzle and the cinchona tree, whose bark yields quinine. Over the peaks of the Andes soars the largest bird that flies, the great condor. By contrast the lower forested slopes are inhabited by the smallest of all birds, the tiny humming bird.

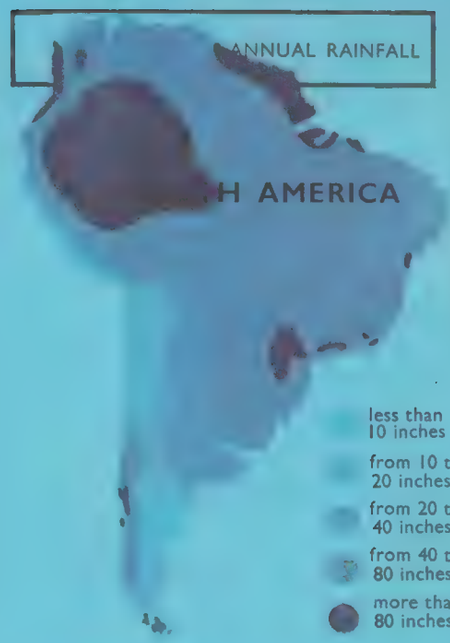
THE EQUATORIAL FOREST. The equatorial part of South America is traversed by a huge river, the Amazon, which flows from the Andes in the west across to the Atlantic Ocean. The basin or catchment area of the Amazon, which lies almost entirely in Brazil, forms the largest area of rain forest in the world. The climate is hot and wet throughout the year, and the land is covered by tall trees, their branches meeting in a continuous canopy overhead. Among the Amazonian trees which afford useful products are the Brazil nut, Para rubber, and cacao trees. These forests are inhabited by a great variety of monkeys, some of which are described on page 2375; they include the agile spider monkeys, the howler monkeys, and the tiny marmosets. Anteaters and armadillos live on the forest floor, and the curious sloths hang upside-down in the trees. The largest beast of prey is the jaguar. The beautiful ocelot is a rather smaller member of the cat family. Tapirs and peccaries, a kind of small pig, are among the larger herbivorous animals. Birds are very numerous; the large parrots called macaws, the toucans with their grotesque beaks, and the humming birds are all characteristic of the Amazon forest. Snakes are numerous and include the largest viper in the world, the bushmaster, and the rivers contain alligators of the type known as caimans. The brilliant blue morpho butterflies, whose wings are used to make jewellery, are also found in this region. The conditions in the Amazon forest are repeated, on a smaller scale, in that of the Orinoco, which flows through Venezuela.

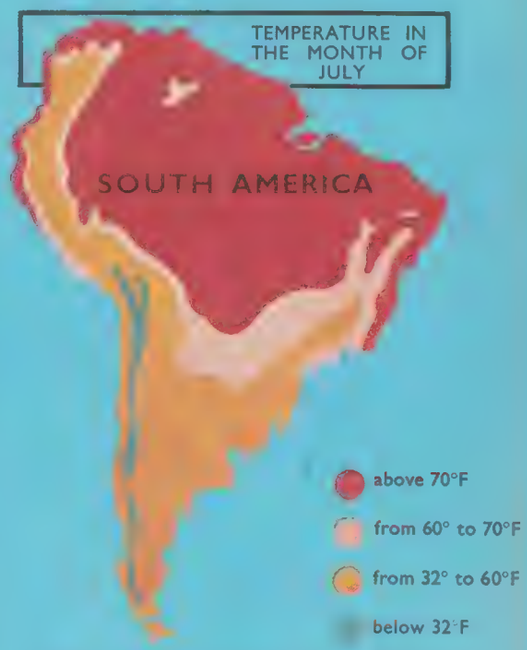
THE GRAN CHACO. To the south the equatorial forest grades into the Gran Chaco of Bolivia and Paraguay. This is a mountainous region with heavy seasonal rainfall alternating with drought. Its most characteristic tree is the quebracho, which is used to make tannin. The Chaco contains large numbers of birds, among them the easily tamed seriema, which rather resembles the secretary bird of Africa. Snakes are also numerous and include the very poisonous fer-de-lance.

THE PAMPAS. South of the Gran Chaco lie the pampas, the great grassy plains on which the cattle industry of the Argentine flourishes. The native animals of this region include several kinds of armadillo, among them the three-banded armadillo which can roll itself into a ball when danger threatens, presenting only its armoured back to the enemy, and the fairy armadillo or pichiciego, the smallest of all armadillos, which is only 5 inches long. Several kinds of large rodents are found on the pampas, including the viscacha and the coypu. The pampas deer and the ostrich-like bird called the rhea are also common. In the colder southern parts the guanaco ranges down from the Andes on to the plains.

The surrounding seas

Great numbers of cormorants, pelicans, and boobies or gannets live on the islands off Peru. Penguins are found in the south, and one species, the Galapagos penguin, lives in the ocean west of Peru. Whales and seals are found in the southern oceans on both sides of South America.





SIERRA LEONE

Boats being loaded with fruit in Freetown, the capital of Sierra Leone

WEST AFRICA has been in contact with the rest of the world longer than any other part of the African continent south of the Sahara. The Arabs established trading posts on the western fringes of the Sahara in very early times and began the traffic in slaves that was to continue till the end of the 19th century. The coastal regions were visited by a succession of European explorers from the early years of the 15th century. At first most of them were discouraged from landing or settling not only by the hostility of the natives but also by the pounding surf, dense forests, trying climate, and fatal diseases of the area. But the valuable trade in slaves, gold, ivory, and pepper encouraged first the Portuguese and later the Dutch, English, and French to brave these dangers and open up West Africa. The result can be seen on the map – nearly 20 separate states under varied administration. The Colony and Protectorate of Gambia and the independent sovereign state of Sierra Leone are among them.

SIERRA LEONE: HISTORY

Pedro da Cintra, a Portuguese, gave Sierra Leone its name – 'Lion Mountains' – in 1462, probably because of the fierce thunderstorms that rage from March to May over the rugged peninsula on which Freetown, the capital, now stands. In 1505 the first Portuguese shipment of slaves bound for America left Sierra Leone; the British soon followed suit and set up their own slave 'factories' on the coast.

Strangely enough, less than 300 years later Britain was sending Africans back to Sierra Leone instead of taking them away. In 1787 Granville Sharp, with the support of the British government, arranged for some 350 ex-slaves to go to Sierra Leone and found Granville Town on land bought from local chiefs. Shortly afterwards 1,100 'Nova Scotians' – former American slaves who had fought with the British during the American War of Independence and had then gathered in Nova Scotia – also went to West Africa. Britain's first colony settled with an entirely alien population had been founded.

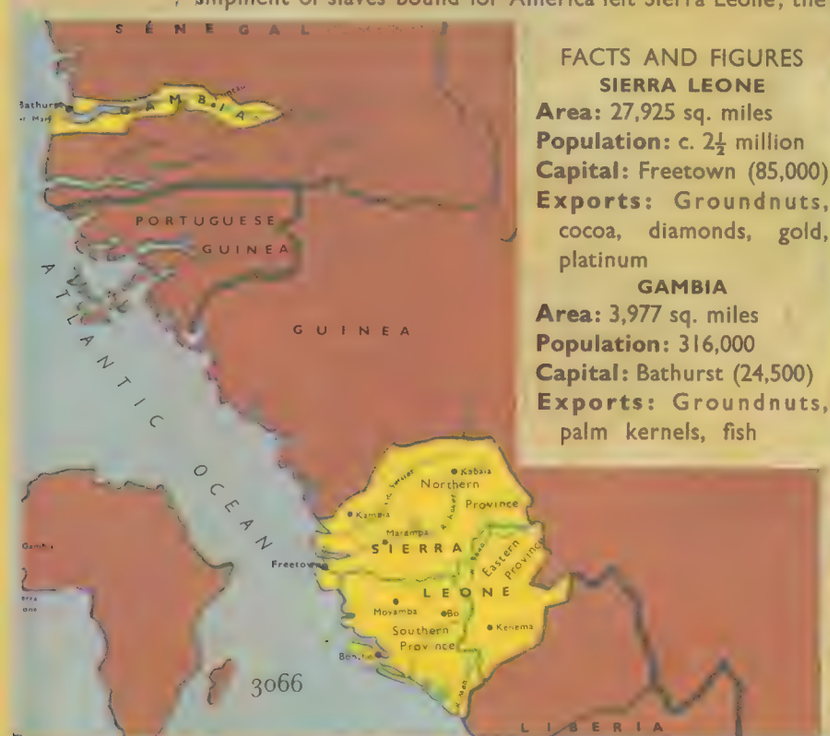
Immigrants from Jamaica also joined these first settlers, who became known as Creoles. The mixture of races produced the Krios, a new African race who spoke their own language, Krio.

In 1808 the British declared the Sierra Leone peninsula a Crown Colony, and in the same year the slave trade was declared illegal. Freetown became an important naval base and played a major role in the suppression of the slave trade; all captured 'cargoes' were released and resettled in or near Freetown. By 1833 some 34,000 freed slaves had been settled in this way.

After the Berlin Conference of 1884–1885 the scramble by European powers for territories in Africa (see page 2986) made it necessary for boundaries in West Africa to be defined. French Guinea had expanded around the northern and eastern sides of Sierra Leone, so in 1898 the British Protectorate of Sierra Leone was formed, and the boundaries with Liberia, in the south-east, were fixed by 1911. Sierra Leone now consisted of 27,669 square miles of Protectorate and 256 square miles of Crown Colony.

THE DISCOVERY OF DIAMONDS

The development of Sierra Leone had long been retarded by lack of capital, but in 1930 the amazing discovery of vast fields of alluvial diamonds, lying on or just below the surface of the gravel beds in the central and eastern regions, brought great new wealth and opportunities to the country. At first much of this wealth was drained away by smugglers, for anyone could collect a bucketful of the gems without difficulty. But then the Government Diamond Office was set up at Kenema to deal with this. Under its strict control the value of industrial diamonds exported rose to over £7 million a year – 15 per cent of the world's supply. Since 1950 over 3,500 miles of road have been built, together with railways and bridges, and the population has risen to over 2½ million.



FACTS AND FIGURES

SIERRA LEONE

Area: 27,925 sq. miles
Population: c. 2½ million
Capital: Freetown (85,000)
Exports: Groundnuts, cocoa, diamonds, gold, platinum

GAMBIA

Area: 3,977 sq. miles
Population: 316,000
Capital: Bathurst (24,500)
Exports: Groundnuts, palm kernels, fish

Diamonds, the basis of the economy of Sierra Leone, being washed in a stream near Kenema

AND GAMBIA

A street scene in Bathurst, the capital of Gambia

A Wollof woman and child of Gambia

A Gambian woman adorned with valuable gold ornaments

SIERRA LEONE TODAY

In April 1961 the Protectorate and Crown Colony of Sierra Leone united to form an independent state within the British Commonwealth. The former Colony is known as the Western Area, and the former Protectorate is divided into the Southern, Eastern, and Northern Provinces. These provinces are subdivided into 146 chiefdoms, each ruled by a Paramount Chief and Council of Elders, under the Central Government.

Freetown commands a view across a wide, deep, and sheltered harbour. It was an important naval base during the First and Second World Wars, and it is equally important today as a centre of trade between the countries of West Africa and Europe. It is also the site of Fourah Bay College, famed as the 'Athens of West Africa'.

Most of the people of Sierra Leone are peasant farmers, producing palm kernels, cocoa, groundnuts, and ginger for export, and rice and cassava for themselves. Large areas of the great mangrove swamps that run nearly the whole length of the coastline have been reclaimed and cleared for growing rice; tobacco-growing and a few light industries have been started by the government. In the west, around Marampa, there are large deposits of iron ore, and gold and platinum are also mined.

Poor communications, lack of capital, and extreme variations of climate – severe drought from November to February, then almost continuous rain from May to September – still present grave problems, with the result that the economic existence of the people of Sierra Leone is largely dependent on diamonds.

GAMBIA: THE STATE ON A RIVER BANK

Gambia, some 300 miles from Sierra Leone, is a narrow strip of territory, about 7 miles wide and 300 miles long, on either bank of the Gambia river. It is the oldest British possession; the first British trading rights there date from 1588. From 1807 British settlements along the river were controlled from Sierra Leone, but Gambia received its own governor in 1829 and became a separate Crown Colony in 1843. Its boundaries were not finally settled until after 1890, and in 1902 the area inland was organised as a Protectorate in much the same way as in Sierra Leone. The Colony, which contains the chief town, Bathurst, today has an area of 29 square miles, and the Protectorate an area of 3,948 square miles. It is planned that Gambia will become independent in 1965.

The climate is a moderate one – subtropical, with blue skies and fresh breezes from December to April, and a rainy season with higher temperatures from June to October.

The Gambia, one of the finest navigable rivers in Africa, is the main line of communication between the coast and the interior. Ocean-going ships can sail 150 miles upstream to Kuntaur, and smaller boats can penetrate inland for up to 292 miles. The river rises on the Futa Jallon plateau and flows north-eastwards before swinging round in a wide arc to flow westwards into the Atlantic. In the region known as Upper River the Gambia flows in a gorge well below the level of the plateau, but the level of the ground drops in the Middle and Lower River regions, merging into salty swampland on the coast.

Bathurst, St Mary's Island on which it stands, and the district of Kombo St Mary on the mainland make up the Crown Colony, with a population of 34,000. The Protectorate is administered separately in four districts, each with its own Commissioner, and has a population of 260,000. 93 per cent of the population lives on the plateau away from the river. Here the peasant farmers grow groundnuts, while rice is cultivated on the edges of the *banto faros* or broad swamps that line the lower reaches of the Gambia.

Tsetse flies and mosquitos are still a considerable scourge in Gambia, but in recent years much has been done to rid the region of the reputation which it once had as 'the white man's grave'.

Boats loaded with groundnuts, the principal Gambian export

ELIZABETHAN

Robert Greene. Contemporary woodcut titled 'Greene in Conceipte' (that is, 'conception' or creativity)

IN one sense drama as we know it was born in the days of Queen Elizabeth. For it was not until 1576 that London's first public theatre was opened in Shoreditch. Until then plays had been performed in the homes of great men or in courtyards. But the growth in dramatic output and in the number of companies of itinerant actors worked towards the creation of the 'popular theatre'. The government took a poor view of the ever-increasing number of companies of actors, and this official hostility explains why those first public theatres – the *Swan*, the *Globe*, the *Rose*, and the *Fortune* – were located outside the reach of London's civil authorities.

Elizabethan theatres were open to the elements, and the stage projected outwards, surrounded on three sides by the audience. This led to the development of certain characteristics of Elizabethan drama such as the murmured soliloquy and the aside. Another physical factor influencing Elizabethan plays was lack of scenery. This, far from being restricting, enabled the playwright to transfer his scenes from London to Venice, and then on to Istanbul, within a few minutes. But perhaps the best known of the special features of the Elizabethan theatre is the lack of female actors. This led to a profusion of plots in which women characters disguised as men figured.

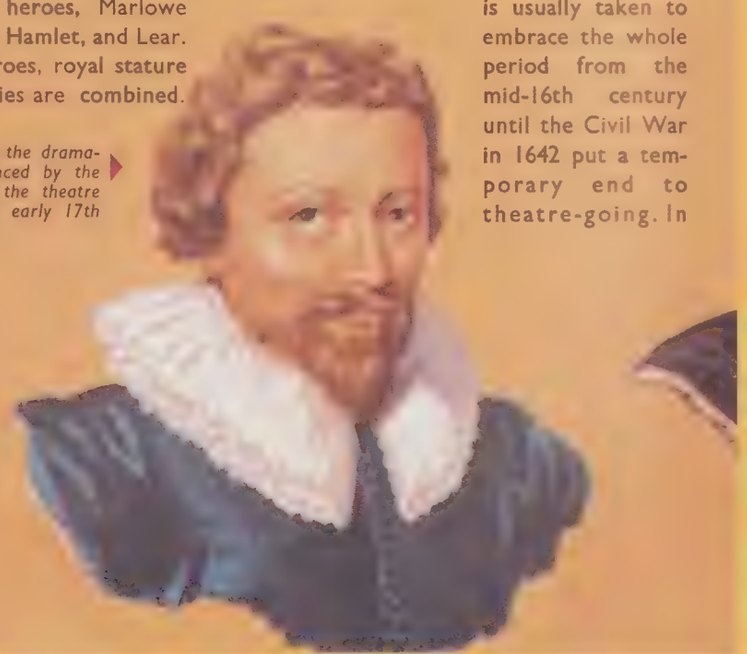
Christopher Marlowe – set the tone for most of the achievements of Elizabethan drama

William Shakespeare – undoubtedly the greatest Elizabethan dramatist

THE DRAMATISTS

William Shakespeare (1564–1616) was incomparably the greatest of Elizabethan dramatists. Although his name will recur in this article, he has been dealt with on page 2122, and here we will concentrate more on the other playwrights who helped to create Elizabethan drama.

Foremost among Shakespeare's predecessors were the so-called 'University Wits', like Robert Greene (1558–1592), author of *Orlando Furioso* and *Friar Bacon and Friar Bungay*. They were men of great learning, though they led dissolute lives. The greatest of them was Christopher Marlowe (1564–1593), whose plays are performed to this day. These include *Doctor Faustus*, *Tamburlaine*, *The Rich Jew of Malta*, and *Edward II*. Marlowe set the tone for most of the achievements of Elizabethan drama. It was his insistence on the *quality* of character – demonic energy or sheer ability – which did so much to break away from the mediaeval conception of worth as being confined to men of high position. Tamburlaine, though a king, was born a peasant; the Jew was a money-lender; Faustus a scholar. Elizabethan dramatists did not reject the idea that high tragedy should deal with kings and queens, but, by developing the personal qualities of his heroes, Marlowe paved the way for Macbeth, Hamlet, and Lear. In Shakespeare's tragic heroes, royal stature and subtle individual qualities are combined.



John Fletcher – one of the dramatists who were influenced by the changing attitudes to the theatre which occurred in the early 17th century

Another enormous legacy of Marlowe is his use of blank verse. Marlowe showed that, used properly, blank verse could lend a grandeur and dignity to his heroes of a kind unknown in earlier plays. He writes in *Faustus*:

'Was this the face that launched a thousand ships
And burnt the topless towers of Ilium?

Thomas Kyd (1558–1594) was perhaps less of a genius than Marlowe, but his influence was almost as great. His *Spanish Tragedy* showed talent for constructing a plot and maintaining interest and incident, which are absent in Marlowe. In addition the theme of this play – revenge, in which the hero exposes the villain by means of a play within a play and dies glorying in his deed – appears in many subsequent plays, including *Hamlet*. Kyd understood his audience's desire for abundant incident, horror, and sustained interest, yet at the same time that they required finely-drawn characters, exhibiting such unmediaeval refinements as hesitancy and doubt.

All these trends culminated, of course, in Shakespeare. His brilliantly conceived characters, complex, well-constructed plots, sustained interest, and bawdy humour proved not only the climax of theatrical art but also appealed to the hybrid audiences for whom his plays were written.

DECLINE OF THE POPULAR THEATRE

Shakespeare learned his art in the late 16th century. Consequently, although nearly all his great plays were produced after 1600, he stood outside the changes in dramatic styles and techniques which took place between 1600 and 1642. We shall deal with the drama of this period by pointing out where it differs from Shakespeare and his predecessors rather than by concentrating on its considerable individual merits.

Elizabethan drama is usually taken to embrace the whole period from the mid-16th century until the Civil War in 1642 put a temporary end to theatre-going. In

DRAMA

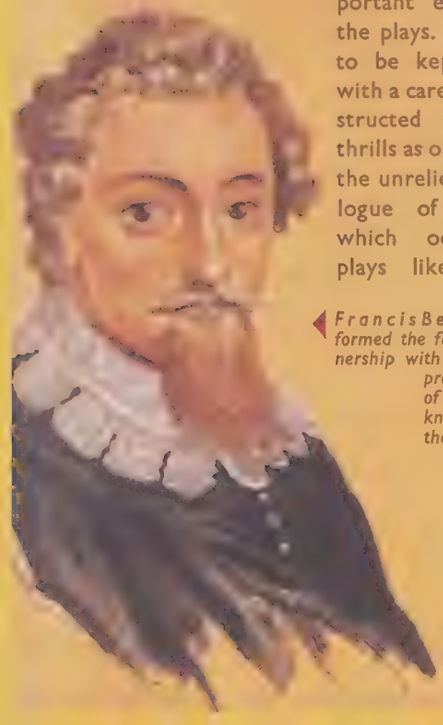
Benjamin Jonson benignly presides over a gathering of his youthful circle of admirers

some ways this is unfortunate, for there are fundamental differences between the theatre of the early 17th century and that of the late 16th.

One of the most obvious changes after 1600 was the simple advance in dramatic technique. Ben Jonson (1572–1637), who emerged at the end of the 16th century, was a master of the elaborate, ingenious plot, skilfully weaved through the entire play – as in his famous *Alchemist*. This was partly due to the growth of Spanish influence on English drama, with its love of intrigue and involved situations. In fact, one of the chief characteristics of Jonson, and the early 17th century, is the tremendous emphasis placed on situation. This was often at the expense of characterisation. Many of Jonson's comic characters are totally unrealistic. They portray but one predominant facet or 'humour' of human nature and strut about the stage as the epitomes of cunning (Volpone) or other vices. The type of comedy where certain characteristics are portrayed in exaggeration and thus ridiculed is called satire, and Jonson was perhaps the first master of satire in the theatre. There were other satirists in this period too, among them Middleton (1580–1627) and Massinger (1583–1639).

Why did these changes occur? One reason was that the audiences were changing. Under James I and Charles I society tended to divide into the pleasure-seeking, play-going courtiers and cavaliers, and the high-minded Puritans, who rejected such frivolities. Thus audiences became increasingly upper-class. They demanded the intrigues and subtleties of fantastically complex plots, and they preferred satire to rough puns and earthy humour.

The upper-class audiences had other important effects on the plays. They had to be kept awake with a carefully constructed series of thrills as opposed to the unrelieved catalogue of horrors which occurs in plays like Shakespeare's *Titus Andronicus*. These contrived climaxes often resulted in a sense of anticlimax.



Francis Beaumont – formed the famous partnership with Fletcher to produce some of the best-known plays of the early 17th century

To enhance these regular thrills playwrights like Fletcher (1579–1625), Webster (c. 1580–1625), Tourneur (1575–1626), and Ford (1586–1640) repeatedly used devices like drinking cups made out of skulls, sawn-off hands, and tortures presented on stage. Webster and Tourneur are among the greatest of tragic playwrights. Webster's *White Devil* and *Duchess of Malfi* and Tourneur's *Revenger's Tragedie* are still performed today.

We have said that these plays often contain anticlimaxes. Another kind of anticlimax is common in the tragi-comedies of this period. In these a horrific situation leads to an artificially tame conclusion. In Middleton's *The Witch* a wife attempts to murder her husband, thinks she has succeeded, but finding he is still alive the pair simply make up.

After 1600 there is also a tendency for dramatists to dwell on unhealthy, immoral themes. Immorality is a favourite subject of Ford's and also appears in Middleton's *Women Beware Women* and Beaumont (c. 1584–1616) and Fletcher's *A King and No King*. Alongside this is a tendency to concentrate on maudlin, sentimental subjects. Dramatists used every method to stir the emotions of their audiences, and in doing so became artificial.

One other effect must be mentioned. Being politicians themselves, the upper-class audiences demanded politics and 'current affairs' in their plays. Many dramatists were strongly pro-royalist, and so they filled their works with loyal sentiments and poured scorn on the populace. This was unfortunate because it further divorced the theatre from the general public and emphasised the decline of the popular theatre.

We have been able to mention only a few of the outstanding trends and figures in the great age of Elizabethan drama. There were many other dramatists whose contribution to the theatre was very great indeed. But this is not surprising, for, taken as a whole, Elizabethan drama was at least as great as any other single movement in English artistic life. It is the English counterpart of the Italian Renaissance. The Italians gave paintings and sculptures to posterity which will be revered for ever. The Elizabethans bequeathed plays to be cherished wherever English is spoken.

The Globe theatre was typical of Elizabethan theatres – circular in shape and roofless

1848—THE YEAR OF REVOLUTIONS

FOR over fifty years Europe had been through a ferment of upheaval and change. The slogans of the French Revolution – liberty, equality, and fraternity – had given men the hope of a new sort of society. And as Napoleon's mighty armies vanquished Austria, Prussia, and Russia the subject peoples of Europe – Italians, Belgians, Poles, Hungarians, and Slavs – glimpsed a new age – an age in which the shackles of the great powers would be cast off.

The twin ideals, *liberalism* and *nationalism*, were legacies of the French revolutionary era. But after France's defeat at Waterloo the great powers once more reasserted themselves. The old order was re-established, and new ideals repressed. The Bourbons were restored in France. Metternich (see page 2720) of Austria presided over a system aimed at crushing liberalism everywhere. Most of northern Italy and millions of Magyars and Slavs were ruled by Austria. The Poles were cruelly governed by Russians.

The result of the reaction was that liberals and nationalists were forced underground. Secret societies, like the *Carbonari* of Italy, sprang up. Students in particular conspired tirelessly against illiberal governments and alien rulers.

There were many signs of unrest. 1830 was a 'little year of revolutions' when the Belgians revolted against their Dutch masters and the French replaced the Bourbon Charles X with the Orléanist Louis Philippe. But by and large the old regimes remained intact, until, in the space of one momentous year, the pent-up frustrations of a fettered generation exploded into violence. Like a tidal wave, revolution swept over the continent. Thrones toppled, kings and ministers fled, constitutions were set up, and independence proclaimed. The year was 1848.

Prince Metternich – opponent of liberalism

The revolution in France

The spark which set Europe alight came from France. King Louis Philippe had enemies on both Right and Left: 'legitimists' who wanted to restore the Bourbons and socialists who wanted universal suffrage, political equality, and social security. The revolution came quite suddenly and unexpectedly. A huge banquet for all opposition groups was arranged for 22nd February 1848. The government threatened to prohibit it, but on the night of the 21st and 22nd the Paris mob intervened. Chanting socialist slogans, they smashed government buildings and were joined by government troops. The King lost his nerve. On 25th February the Orléanist monarchy collapsed, and the King fled with his family to England.

Louis Kossuth, the Hungarian patriot, harangues an anti-Austrian crowd

A provisional government was established which included representatives from both Right and Left. At first the socialists, led by Louis Blanc, were powerful. But the socialist policy of establishing National Workshops, where all the unemployed were guaranteed labour, proved a disastrous failure. There was more rioting, and finally a right-wing National Assembly took over and prepared a new constitution. France was to be a republic governed by a president. The chief candidate for the presidency was a man of little fame, but with a magical name – Louis Bonaparte, nephew of the great Napoleon. By an overwhelming majority he defeated his opponents and took office in December 1848. France was a republic, and her 1848 revolution had, if only temporarily, triumphed. But by the time Louis Napoleon took office things had happened elsewhere in Europe which had shaken the political foundations of the continent to the core.

The revolution in Italy

There was no such nation as Italy in 1848. Sardinia, the main part of which was Piedmont, was a separate kingdom. Naples and Sicily also formed a kingdom, and other grand duchies and republics were also independent states. Lombardy and Venetia were ruled by Austria. Central Italy was in the hands of the Pope.

In Italy there were two kinds of revolutionary feeling. One was liberal, detesting the despotic governments of the various Italian rulers. The other was national and longed for Italy to be united.

The impetus to Italian revolution came from a strange quarter. Pope Pius IX was elected in 1846. He gained the reputation of a 'liberal Pope' and used the phrase 'God Bless Italy', which was interpreted as support for national unity. Yet how could the Pope support a movement which could only succeed if Catholic Austria were defeated? Before the end of 1848 Pius had fled into exile, terrified

in a Magyar village

of the passions he had inflamed and condemning the whole movement.

Rioting broke out early in 1848, and in southern Italy Ferdinand of Naples and Sicily immediately granted a constitution. He was followed by Leopold, Grand Duke of Tuscany. Granting a constitution became the formula by which frightened monarchs sought to appease their rebellious subjects.

Nationalist supporters looked to Charles Albert of Piedmont, the only Italian strong enough to oppose Austria. He decided to adopt the cause of liberalism and a united Italy. In February he granted a constitution, and a new wave of revolutions spread through Italy. There were risings against the Austrians in Milan, Lombardy, and Venetia, and on 23rd March Charles Albert issued a proclamation to Lombardy and Venetia informing them that they could count on his support. He raised the Tricolour of a united Italy and sent an army to aid the rebels against Austria.

The result was a fiasco. The Italians were at odds among themselves, and Charles Albert's generals were no match for the aged Austrian Radetsky. On 25th July the Italians were routed at Custozza. The Austrians re-entered Milan, and the rebellion collapsed. Ferdinand, the Pope, and the others were able to reassert themselves. Charles Albert made one more effort which led to complete defeat at Austria's hands at Novarra in March 1849. Then he abdicated in favour of his son Victor Emmanuel, who was one day to succeed where his father had failed (see page 1905).

The revolt in the Austrian Empire and Germany

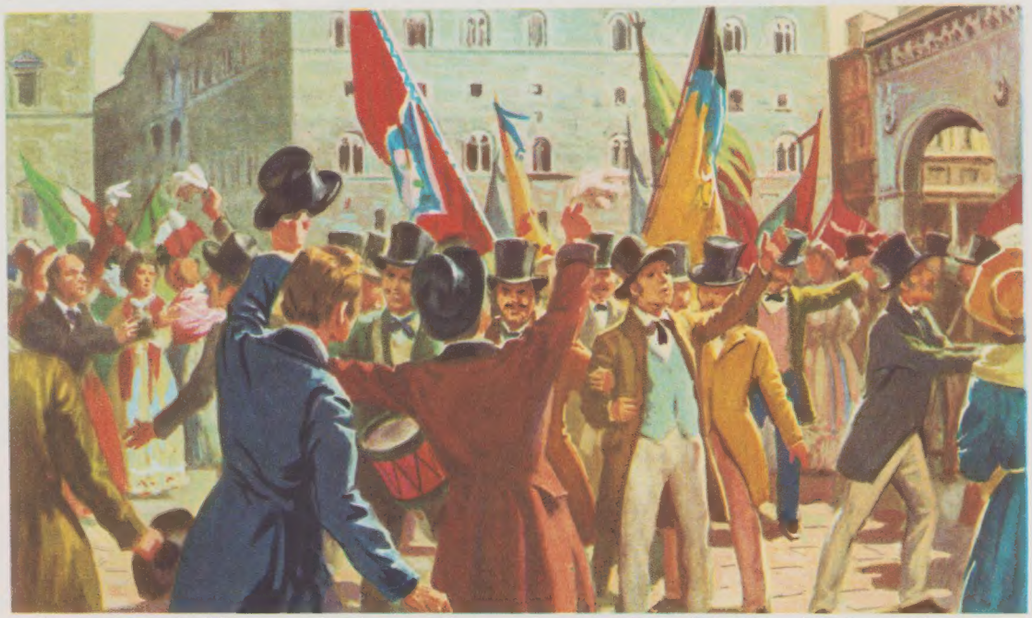
Austria, under Metternich, had long been the symbol of reaction, and it was no surprise when, inspired by the events in France and Italy, Austrian students demonstrated on 12th and 13th March. What was surprising was that the Austrian government lost its nerve, and Metternich himself fled the country. On 15th March the Emperor, a weak, incapable man, proclaimed a liberal constitution and two days later proclaimed one for Hungary following a revolution in Budapest.

The revolt in Budapest was very different from that in Vienna, for there Hungarian nationalists, Magyars, had revolted against the rule of the foreigner – Austria.

Meanwhile events were moving fast in other parts of Germany. On 18th March Frederick William of Prussia granted a constitution, and soon all the German kings followed suit. On 21st March he proclaimed that Prussia was merged into Germany. On 31st March a *Vorparlement* met to prepare the way for German unity. It chose a National Assembly with representatives from all over Germany, but this attempt at unification was to prove fruitless.

The reason for its failure was the collapse of the revolution. In June a Czech revolt in Prague was crushed by an Austrian army under Windesgratsch. The news of Custozza in July further encouraged the opponents of the revolution. In September the Croat leader Jellacic led an army against the Magyars, whose leader, Kossuth, had made it clear that Serbs, Croats, and Rumens could expect no favours from an independent Hungary. In October Austria declared war on Hungary. On 30th October Windesgratsch entered Vienna. The army was in command. The constitutional promises of the Emperor were ignored, and in March 1849 the Austrian parliament was dissolved.

In Prussia Frederick William demonstrated that the near success of the revolutions was nothing more than loss of nerve by the rulers. In December he simply dissolved parliament, and with his army intact no one could oppose him. The ineffectual



A street scene in Florence – cheering crowds greet the concessions of the Grand Duke of Tuscany

National Assembly continued to sit and in March 1849 offered the crown of a united Germany to the Prussian king. He refused, and that was to all intents and purposes the end of the revolution in Germany.

In the Austrian Empire Kossuth's Magyars put up a prolonged and heroic resistance, but even by the end of 1848 it was clear the year of revolutions had failed. Yet it showed that repression alone could not crush ideals like that of freedom. History was on the side of the revolutionaries, and the second half of the century was to see the triumph of those causes fought for in 1848.

THE COMMON COLD

TWICE a year, on the average, everyone in the British Isles suffers from a cold in the nose. Young people, particularly schoolchildren, frequently have as many as 3 or 4 colds each year, while old people, who seem to have a certain immunity to colds, may very often go for several years without once becoming infected. Whether this immunity in old people is real or only an apparent one, resulting from their restricted way of life, is difficult to tell. Old people certainly have fewer contacts with sources of infection than do schoolchildren and therefore fewer opportunities for catching colds.

A cold in the nose occurs more frequently than any other infectious disease, and it has therefore, with very good reason, been called the *common cold*. The common cold is caused by a virus or rather by several different viruses, all of which have a preference for the mucosa which lines the nasal passages. Infection by these viruses causes the mucosa to swell and pour forth excessive amounts of nasal mucus. It is this which brings about the most evident and distressing symptom of the common cold – the blocked and running nose.

THE SYMPTOMS OF A COLD

A few moments spent in the presence of a person with a severe cold is quite long enough for an uninfected person to become infected. Everybody knows this, and, consequently, most people have good reason to suspect that they are about to have a cold long before the first symptoms appear.

The incubation period for the common cold – that is, the time between infection and the first appearance of symptoms – is about 48 hours. The victim then begins to feel a little soreness in one or both of his nostrils, particularly when he breathes in. Very often this soreness is accompanied by bouts of sneezing. Some people's colds characteristically begin, instead, with a mild sore throat.

The most characteristic symptom of the common cold – the blocked and running nose – usually follows within 12 hours of the soreness. At first large amounts of a rather watery mucus pour from the nose (this is the paper handkerchief stage), but after about two days the mucus becomes much thicker and smaller in quantity. During this time the victim has usually to breathe through his mouth, for the nasal passages are completely blocked by the swollen mucosa and the excess mucus.

After about four more days the swelling of the nasal mucosa subsides and the amount of mucus produced returns to normal. For many people the cold is now completely over, the symptoms having lasted for just a week altogether.

Less fortunate individuals, however, frequently develop a cough at this stage which may continue, irritatingly, for at least another fortnight before it finally disappears and they may be said to have recovered completely.

Inflammation of both the frontal (orange) and the maxillary (blue) sinuses may complicate a common cold attack

COMPLICATIONS

The most frequent complication of the common cold is *sinusitis* – the infection of the air spaces (sinuses) within the bones at the side of and above the nasal passages. This complication is often very unpleasant and painful, and treatment with antibiotics is frequently needed to suppress the bacteria which are chiefly responsible for its development.

For very small babies, who are being fed either at the breast or from a bottle, a cold is a quite serious illness. Because of his blocked nose the baby has to use his mouth both for breathing and for feeding. Consequently he may have such difficulty in sucking that he becomes completely exhausted long before getting sufficient milk.

TREATMENT

Quinine, brandy, whisky, tea, lemon and honey, hot milk; all these and many other remedies have been recommended for the treatment of the common cold. None of them, however, appears to be very effective. The best treatment is undoubtedly a few days spent in bed with a large box of paper handkerchiefs. This will not only bring about a spontaneous cure within a week, but it will probably save the remaining members of the household from becoming infected with the cold.

During the last few years a number of tablets have appeared which, when taken by mouth, relieve the swelling of the nasal mucosa and thus make it easier for the victim of a cold to breathe through his nose. Many people find these tablets most helpful, and, so long as they are taken in moderation, they are quite harmless.

THE DISCOVERY OF THE VIRUS

The virus of the common cold was first discovered in 1953 by a team of British virologists working at a hospital in Salisbury. Unfortunately there were difficulties in growing this first common cold virus, and after a time the strain was lost. Nonetheless they continued their search and in 1959 again succeeded in isolating a virus which would cause a cold.

Since that time British and American virologists have succeeded in isolating many viruses which cause colds, and it is now certain that there is not just one virus responsible for causing colds but a large number of different ones. This variety of cold viruses may, to some extent, account for the fact that the symptoms of colds are not always exactly the same.

THE PREVENTION OF COLDS

At the present time the best way of preventing colds is for the cold victim to retire to bed. His contacts with other people are thus reduced to a minimum and the chance of his cold spreading is correspondingly minimised.

One day, perhaps, there will be a vaccine for the prevention of colds, or a drug may be found which will prevent the cold viruses from growing in the nasal mucosa. But until then we shall continue to be plagued by this most common of infectious diseases.

SUBSCRIPTIONS

The following magazines can be sent weekly to you, or any person at home or abroad named by you, at the following rates:

ANNUAL SUBSCRIPTION

KNOWLEDGE	£5 4 0	**DISCOVERING ART**	£9 2 0 (£4 11s. for 6 months)
TOUT L'UNIVERS (French *Knowledge*)	£7 16 0	**ANIMALS**	£6 10 0
		FINDING OUT	£5 4 0

Cheques or postal orders should be crossed and made payable to Knowledge Publications and sent to Subscription Department, Knowledge Publications, 37 Hertford Street, London, W.1.

You should indicate if you wish your subscription to start from the first issue or the current issue. Single copies of back numbers are available at the following prices:

KNOWLEDGE, FINDING OUT: 2s. **ANIMALS:** 2s. 6d. **TOUT L'UNIVERS:** 3s. 6d. **DISCOVERING ART:** 3s. 6d.

All postage and packing paid by us

Sole Distributors (*Knowledge*)	Australia, Gordon & Gotch Ltd. 3/0	New Zealand, Gordon & Gotch Ltd. 2/6	South Africa, Central News Agency Ltd. 27½c	Rhodesias and Nyasaland, Kingstons Ltd. 3/0	India, Lalvani Bros. Rs 1.60	Malaysia, Marican & Sons Ltd., Malaya $1.00

On this page and the next we give examples of all the categories of animals shown in the table of classification on the previous page. Those of the left-hand column of this page illustrate nine of the ten Phyla mentioned. The top two pictures of the right-hand column illustrate two Subphyla. All the rest illustrate various animal Classes.

The Chordata are animals which have at some stage in their existence a supporting rod in their back called the notochord. In the adults of the higher Chordata (the vertebrates) this is replaced by the backbone or vertebral column.

PHYLA

octopus

crayfish

leech

starfish

roundworm

tapeworm

jelly-fish

comb jelly

sponge

Mollusca. Animals with a soft body usually protected by a hard limy shell; many have a rasping feeding organ called a radula. The majority of molluscs live in the sea.

Arthropoda. The body of these animals is divided into segments and the limbs are jointed; body and limbs are covered by an external skeleton of a horny substance called chitin. The skeleton is periodically moulted to allow the animal to grow. This Phylum contains a larger number of species than any other.

Annelida. The segmented worms. Their body is divided into numerous segments in each of which the internal organs are repeated; externally the segments appear as rings. They are found in the sea, on land, and in fresh water.

Echinodermata. The body of these animals is radically symmetrical (like a wheel or a flower) and is usually in five parts. They have a vascular system in which water circulates. They are found only in the sea.

Nemathelminthes. Roundworms. They live on land, in water, and as parasites. There are large numbers of them in the soil, and some, known as eelworms, are agricultural pests.

Platyhelminthes. Flatworms and tapeworms. Flattened, soft-bodied worms, many of which are dangerous parasites in man and other animals. Some flatworms are not parasitic, however, and live in the sea, in fresh water, and in damp places on land.

Coelenterata. Radically symmetrical animals with a hollow body and stinging cells which they use to kill their prey. Some are free-swimming (jelly-fishes); others are fixed (sea-anemones). Nearly all coelenterates live in the sea, but a few live in fresh water.

Ctenophora. Comb jellies. A Phylum of purely marine animals which somewhat resemble the coelenterates but have no stinging cells. They swim by means of tiny hairs called cilia.

Porifera. Sponges. By far the most primitive metazoan animals. Their body consists of masses of cells which are not differentiated into tissues, and they have no nerve cells. Nearly all are marine, but a few live in fresh water.

The pictures on the right are all of animals of the Phylum Chordata. It is divided into Subphyla, of which the Vertebrata is by far the most important. The others are all obscure marine animals which are of interest because they give clues to the evolutionary origin of the vertebrates.

Chordata

SUBPHYLA

skeleton of cow

branchiostoma

CLASSES

brown bear

redwing

iguana

tadpole

edible frog

perch

colony of tunicates

salp

Pisces. Fishes are the most primitive of the vertebrates and all of them live in water, although a few have accessory organs for breathing air. They differ from the other vertebrates in having two pairs of fins instead of limbs.

Ascidacea. A Class of the Subphylum Urochordata. These animals are generally known as tunicates or sea-squirts, and the adults' body is bag-shaped. Their affinity with the chordates is only apparent in the early stages of their life. They live in the sea.

Thaliacea. Another Class of the Urochordata, commonly known as salps. They resemble tunicates in having young or larval stages with chordate characteristics; as adults they live floating in the waters of the sea.

VERTEBRATA. The Subphylum that includes all animals with an internal skeleton of bone (or sometimes of cartilage). Fishes are the most primitive vertebrates, mammals the highest.

CEPHALOCHORDATA. Small segmented animals which look rather like fishes. They have numerous gill-slits and a notochord but no backbone. They live in the sea.

Mammalia. Warm-blooded vertebrate animals whose skin is usually covered with hair. Almost all of them bear their young alive and feed them on milk during the early part of their lives. Most mammals live on the land, but some are adapted for life in the sea or fresh water, and one group of them – the bats – can fly. Mammals are found in all types of climate.

Aves. Birds, like mammals, are warm-blooded, but all of them reproduce by laying eggs and have a body covered with feathers. The great majority of birds can fly, and they are found in all climates and on all continents.

Reptilia. The highest Class of cold-blooded vertebrates. Cold-blooded means that their temperature varies with that of their surroundings. Most reptiles live on land, a few in the sea. They are most abundant in warm climates.

Amphibia. The amphibians are distinguished from the reptiles chiefly because their young (generally called 'tadpoles') live in water and breathe with gills like fish. The adults are air breathers, but usually live in damp surroundings. Amphibians are thus far less independent of water than the reptiles.

No. 192 Volume 16

Knowledge

Printed in Great Britain by Purnell & Sons Limited
Paulton, Nr. Bristol

Published by arrangement with
Fratelli Fabbri Editori
Milan

© 1960 Fratelli Fabbri Editori Milan

© 1964 Purnell & Sons Ltd.

Zoology (part two) *Cover*
Henry IV *3057*
Counties of South Wales *3058*
Australia: history *3060*
The Orthoptera (part two) *3062*

contents

South America: flora and fauna *3064*
Sierra Leone and Gambia *3066*
Elizabethan drama *3068*
1848 – the year of revolutions *3070*
The common cold *3072*

contents

snail

squid

Venus shell

mussel

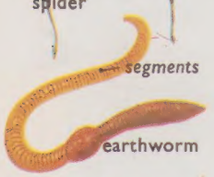
crab

wasp

cockchafer

millipede

spider


segments

earthworm

sea urchin

starfish

In these two columns are examples of Classes of animals belonging to the Phyla we have already mentioned.

Mollusca

Gastropoda. All the molluscs called snails belong to this Class. They crawl about on a flattened, muscular 'foot', and their internal organs are twisted, due to the spiral shape of their shell. Usually they have a head with tentacles and eyes.

Cephalopoda. Active, free-swimming molluscs, armed with tentacles with which they seize their prey; many of them eject a cloud of 'ink' into the water when they are frightened. All cephalopods live in the sea.

Lamellibranchiata. The bivalve molluscs, which have a body enclosed between two shells or 'valves', hinged together. Most bivalves burrow in sand, mud, or rock or are permanently attached to rocks in the water.

Arthropoda

Crustacea. Arthropods with two pairs of antennae on the head; the chitinous skeleton is often impregnated with lime and is hard and rigid. Most crustaceans live in the sea or in fresh water.

Insecta. Their body is divided into three parts: head, thorax, and abdomen; they have 3 pairs of legs and, usually, 2 pairs of wings. Insects are mainly inhabitants of the land and are the most numerous and varied of the Metazoa.

Diplopoda and *Chilopoda.* These are the millipedes and centipedes, which were formerly classed together as the 'Myriopoda'. Millipedes have two pairs of legs on each body segment, centipedes only one. Both Classes live only on land.

Arachnida. Arthropods which resemble insects, but have 4 pairs of legs and no wings. Spiders are the most important group. They spin silk to make their homes or catch their prey.

Annelida

Oligochaeta. This Class of segmented worms includes the earthworms which are found in the soil and in fresh waters. Another Class of the Annelida, the *Hirudinea* or leeches, feed on the blood of higher animals.

Echinodermata

Echinoidea. Globular or bun-shaped echinoderms with a skeleton of closely set plates which are covered outside with spines. Some burrow in sand and others live among rocks in shallow coastal waters.

Asteroidea. Starfishes. Star-shaped animals, usually with 5 arms, sometimes more. They move by means of numerous tube-feet, which are arranged in grooves on the underside of their body. They feed mainly on bivalve molluscs.

Ophiuroidea. Brittlestars. Flattened animals, rather like starfishes, but their arms are slender and sharply marked off from the central disc which forms their body. The arms are flexible and are used, together with the tube-feet, in locomotion.

Holothuroidea. Sea cucumbers. Cucumber- or sausage-shaped echinoderms with a soft body and, usually, a thick, leathery skin. The mouth is surrounded by a ring of branched tentacles. Abundant and varied in tropical waters.

Crinoidea. Sea lilies and feather stars. Echinoderms that usually live fixed in one place, either by a stalk or by root-like organs; some are fixed only when they are young. Their arms are slender and branched and very fragile. Crinoids are abundant as fossils and most living species are found in warm seas.

Coelenterata

Hydrozoa. Mostly small coelenterates, some of which exist in the fixed or 'polyp' form, others in the free-swimming or 'medusa' form. The finely branched, plant-like sea ferns are hydrozoans and so is the little fresh-water animal called *Hydra.*

Scyphozoa. Jelly-fishes. Fairly large (sometimes very large) free-swimming coelenterates. The adult is nearly always of the medusa form, but the young have the form of polyps. Some kinds can sting very severely.

Anthozoa. Sea anemones and corals. These exist only in the polyp form. A sea anemone is a typical single polyp and is often brightly coloured; the corals consist of numerous polyps crowded together, usually supported by a limy skeleton. The massive or reef-building corals are found in tropical seas.

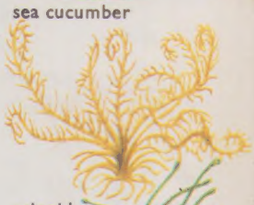
PROTOZOA

Sarcodina. The amoeba is a typical member of this Class; it moves by putting out flowing extensions of its body called pseudopodia. The marine Foraminifera are Sarcodina with beautifully formed limy shells.

Ciliata. The most highly developed protozoans. Their body has a definite shape and is covered with fine hairs called cilia, which lash the water in a constant direction. Some ciliates use their cilia to swim, others to produce currents of water for gathering food.

brittlestar

sea cucumber


crinoid

hydra

jelly-fish

sea anemone

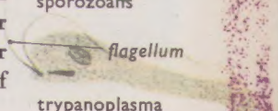
pseudopodia

amoeba

cilia

paramecium

sporozoans


flagellum

trypanoplasma